PB-230 514

# POLLUTION OF THE INTERSTATE WATERS OF THE POTOMAC RIVER (WASHINGTON METROPOLITAN AREA), DISTRICT OF COLUMBIA-MARYLAND-VIRGINIA. PROCEEDINGS OF CONFERENCE HELD AT ARLINGTON, VIRGINIA ON DECEMBER 8-9, 1970

Environmental Protection Agency
Washington, D. C.

9 December 1970

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# PROCEEDINGS

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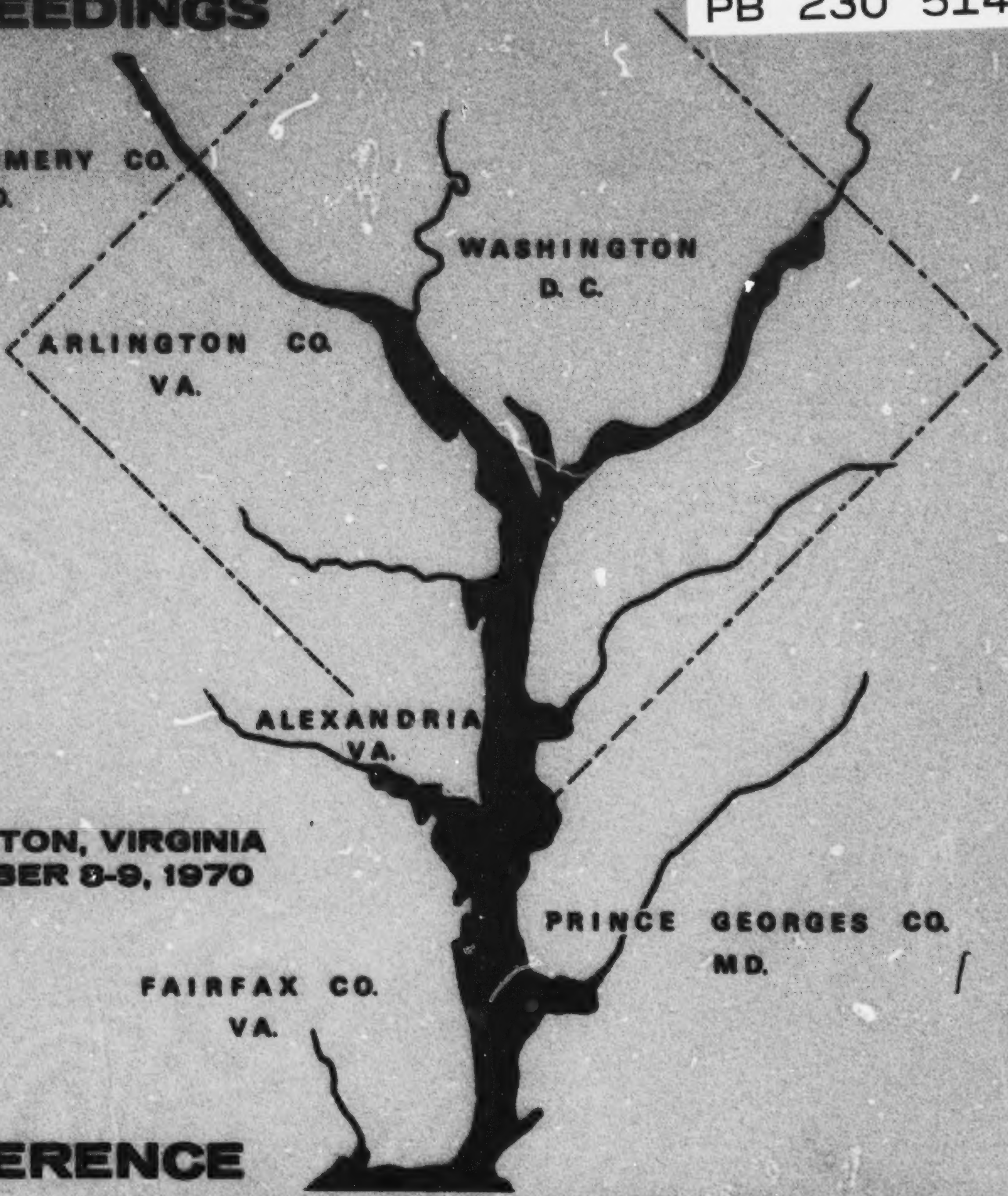
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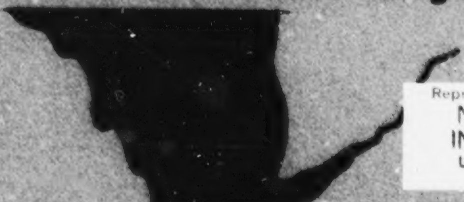
DECEMBER 8-9, 1970
Vol. 2

# CONFERENCE

## Pollution of the Interstate Waters of the Potomac River (Washington Metropolitan Area) District of Columbia-Maryland-Virginia



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ENVIRONMENTAL PROTECTION AGENCY — WATER QUALITY OFFICE

204

# PROGRESS MEETING

# IN THE MATTER OF POLLUTION OF THE INTERSTATE WATERS OF THE POTOMAC RIVER AND ITS TRIBUTARIES -- (WASHINGTON METROPOLITAN AREA) -- DISTRICT OF COLUMBIA -- MARYLAND -- VIRGINIA

Marriott Twin Bridges Motor Hotel
Arlington, Virginia
December 9, 1970
9:30 a.m.

ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE

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423-259

The Progress Meeting of the Potomac River-Washington Area Enforcement Conference, held at the Marriott Twin Bridges Motor Hotel, Arlington, Virginia, reconvened on December 9, 1970, at 9:30 a.m.

PRESIDING:

Murray Stein, Assistant Commission for Enforcement and Standards Compliance, Environmental Protection Agency, Water Quality Office, Washington, D. C.

CONFEREES:

F. R. Blaisdell, Acting Regional Director, Middle Atlantic Region, Environmental Protection Agency, Water Quality Office, Charlottesville, Virginia.

George Carley, Assistant Director, Interstate Commission on the Potomac River Basin, Washington, D. C.

Howard E. Chaney, Acting Director, Environmental Health Services, Maryland Department of Health and Mental Hygiene, Baltimore, Maryland.

Paul V. Freese, Deputy Director, D. C. Department of Sanitary Engineering, Washington, D. C.

A. W. Hadder, Director, Enforcement Division, Virginia State Water Control Board, Richmond, Virginia.

Malcolm Hope, Associate Director for Environmental Health, D. C. Department of Human Resources, Washington, D. C.

CONFEREES (Continued)

Norman E. Jackson, Director, D. C. Department of Sanitary Engineering, Washington, D. C.

Carl J. Johnson, Executive Director, Interstate Commission on Potomac River Basin, Washington, D. C.

Paul W. McKee, Director, Maryland Department of Water Resources, Annapolis, Maryland.

PARTICIPANTS:

Grover W. Cook, Acting Director, Office of Enforcement and Standards Compliance, Middle Atlantic Region, Environmental Protection Agency, Water Quality Office, Charlottesville, Virginia.

Johann Aalto, Chief, Chesapeake Technical Support Laboratory, Environmental Protection Agency, Water Quality Office, Annapolis, Maryland.

Royal C. Thayer, Sanitary Engineer, Planning and Evaluation Office, Environmental Protection Agency, Water Quality Office, Charlottesville, Virginia.

William J. Riley, Office of Enforcement and Standards Compliance, Environmental Protection Agency, Water Quality Office, Charlottesville, Virginia.

R. Kenneth Tinsley, Chief, Surveillance Branch, Environmental Protection Agency, Water Quality Office, MAR, Charlottesville, Virginia.

# PROCEEDINGS

MR. STEIN: Let's reconvene.

We will continue with the Federal presentation.

Mr. Blaisdell.

MR. BLAISDELL: Mr. Grover Cook will present the Federal presentation.

## STATEMENT BY
## GROVER W. COOK,
## ACTING DIRECTOR, OFFICE OF ENFORCEMENT AND STANDARDS COMPLIANCE, MIDDLE ATLANTIC REGION, ENVIRONMENTAL PROTECTION AGENCY, WATER QUALITY OFFICE, CHARLOTTESVILLE, VIRGINIA

MR. COOK: Mr. Chairman, conferees: I am Grover W. Cook, Acting Director of Enforcement for the Middle Atlantic Region, Environmental Protection Agency, Water Quality Office, Charlottesville, Virginia.

The Federal Water Quality Administration in cooperation with the States and the Interstate Commission on the Potomac River Basin, has continued the activities initiated after the April-May 1969 Enforcement Conference. These activities include exhaustive studies by the FWQA Chesapeake Technical Support Laboratory on the water quality problems and waste treatment needs of the conference area and the participation on several technical committees established by this conference.

I am pleased to report that some of these activities have recently been completed. Today, we will present four brief reports summarizing the conclusions and recommendations of these studies. The reports to be presented are: 1) the results of the joint oil pollution survey called for by Recommendation 10; 2) a status report on the activities of the Planning Committee established in response to Recommendation 4; 3) a report on stream monitoring activities as required by Recommendation 12; and 4) the preliminary findings of the Chesapeake Technical Support Laboratory study of the Potomac Estuary.

Six other reports were submitted to the conferees at the May 1970 progress meeting. These reports were submitted for the record without discussion by the conferees. The reports were:

1. An FWQA statement of progress at Federal installations, activities in regard to Recommendation 4, 10, and 12, and discussion of FWQA research and development projects;
2. Stream Monitoring Subcommittee activities;
3. Waste Treatment Plant Operations Subcommittee Conclu-

sions and Recommendations;

4. Preliminary Study of Sediment Sources in the Potomac River Basin.
5. Statement of the Maryland Department of Water resources; and
6. Statement of the Interstate Commission on the Potomac River Basin.

In addition, other unfinished business includes the acceptability of the Potomac Electric Power Company report, and consideration of expansion of the conference area to include a part or all of Prince William County, Virginia, as recommended by the testimony of at least three private citizens.

We have in the handout a rather detailed discussion of the Federal installations. We will not take time to read that here, but we will ask that the entire statement be entered into the record, Mr. Chairman.

MR. STEIN: Without objection, that will be entered into the record as if read.

MR. McKEE: Mr. Chairman, may we ask Mr. Cook just to name the Federal installations?

MR. STEIN: Can you name them and see if they are in compliance or not?

MR. COOK: All of these are essentially in compliance. The Naval Communications Station, Cheltenham, Prince Georges County, Maryland; Naval Ordnance Laboratory, White Oak, Silver Spring, Montgomery County, Maryland; Fort Belvoir; the Pentagon, Andrews Air Force Base; Agricultural Research Center.

I think we have a problem with Andrews Air Force Base regarding some oil spillage, and our Federal facilities people are working very hard to get this corrected. Other than that, all of these are essentially in compliance.

We also have in the handout a rather lengthy discussion of the research and development projects in the conference area. There is nothing much new since the May meeting, and I will also skip the discussion of these projects.

- - -

(The report continues as follows:)

Concerning the status of Federal installations in the Enforcement Conference area I can report the following:

1. Naval Communications Station, Cheltenham, Prince Georges County, Maryland - The station is continuing preliminary negotiations with the Washington Suburban Sanitary Commission (WSSC) for a connection to their sewer

system. WSSC's system in this area conveys wastes to the Piscataway sewage treatment plant. Funds for the connection have been programmed for inclusion in the FY 1972 budget request. The Navy proposes to effect this connection by January 1973.

2. Naval Ordnance Laboratory, White Oak, Silver Spring, Montgomery County, Maryland - Negotiations between the Navy and WSSC to determine the feasibility of connecting to a portion of the WSSC system tributary to the District of Columbia sewage treatment plant are continuing. The connection, if feasible, will coincide with the completion of secondary facilities at the D. C. treatment plant. Funds have been programmed for inclusion in the FY 1972 budget request.

3. Fort Belvoir, Fairfax County, Virginia - Negotiations with Fairfax County to connect to the Lower Potomac sewage treatment facility are continuing. A consulting firm has been retained to prepare a concept design for the Fort belvoir portion of a system to connect to this facility. Design funds are available and construction funds have been requested in the FY 1971 budget. Fort Belvoir's proposal is well within the schedule established by the conference.

4. Pentagon, Arlington, Virginia - Preliminary plans for advanced waste treatment additions to the existing secondary plant have been completed. A consulting engineer has been employed to prepare final plans and specifications. The consultant was given notice to proceed on November 4, 1970, and expects to meet the scheduled completion of final plans date of April 1, 1971.

5. Andrews Air Force Base, Prince Georges County, Maryland - The Base is continuing negotiations with WSSC in an effort to obtain a municipal connection tributary to the Piscataway sewage treatment plant. Project funds have been requested in the FY 1971 budget.

6. Agricultural Research Center, Prince Georges County, Maryland - In May 1970 this installation was reported as being on notice to provide advanced waste treatment facilities in accordance with the conference recommendations. However, no compliance schedules have yet been adopted since the existence of this installation was not previously reported. Specific abatement schedule dates need to be adopted.

In summary, all Federal installations in the conference area are on schedule.

The FWQA progress report submitted to the conferees at the May 22, 1970, progress meeting included a summary of FWQA conducted and supported research and development projects in the conference area. The present status of each project is as follows:

1. FWQA-DC Pilot Plant at Blue Plains

The FWQA-DC pilot plant at Blue Plains is currently engaged in a research plan consisting of five major components, as well as some supporting laboratory-scale activities. The major components are as follows:

a) Conventional - tertiary treatment: The system consists of primary sedimentation, conventional aeration, secondary sedimentation, single-stage line precipitation, ammonia stripping, filtration, pH control and carbon adsorption at an average flow of 100,000 GPD. Objectives are high degrees of removal of phosphorus and nitrogen and moderately high levels of carbon following conventional secondary treatment. Advantages include more proven systems with possibility of reclaiming lime.

b) Independent physical - chemical treatment: The 100,000 GPD system consists of two-stage lime precipitation with intermediate recarbonation, filtration, pH control (water stabilization), selective ion exchange (for ammonia removal), carbon adsorption, and laboratory scale ozone oxidation. Objectives are complete waste treatment from raw sewage through high degrees of removal of phosphorus, nitrogen, and carbon. Advantages include elimination of biological processes, reduced space requirements, and possibility of reclaiming lime.

c) Mineral addition -- conventional -- tertiary treatment: The system includes conventional primary treatment aeration with mineral addition (alum or iron salts), secondary sedimentation, and dual and tri-media filtration at pilot flows of 2,000 GPD as well as laboratory scale. Objectives are equivalent degrees of removal of phosphorus and carbon as conventional-tertiary treatment with less capital facilities. Advantages include reduced capital costs and space for phosphorus removal.

d) Solids handling and recalcination: The system consists of a thickener, vacuum filter alternating with a solid bowl centrifuge, and a six-hearth furnace and will alternate between sludges from the conventional-tertiary and the independent physical-chemical treatment process. Objectives are to develop and evaluate methods of handling and reusing chemicals resulting from advanced waste treatment processes.

e) Pure oxygen process: The system, at an average flow of 100,000 GPD, follows D. C. conventional primary treatment and consists of accelerated activated sludge using pure oxygen and sedimentation for carbonaceous BOD removal followed by second-stage activated sludge using pure oxygen and sedimentation for nitrification. The flow is then to be denitrified using other biological methods or carbon columns. Mineral addition using alum for phosphorus removal was started on 10/1/70. Objectives are to reduce size of treatment units for carbonaceous BOD and nitrogen removal and achieve high degree of carbon removal. Advantages include reduced space requirements, reduced chemicals and sludge production, and potentially makes nitrification-dentrification practical for large metropolitan treatment plants such as Blue Plains.

f) The laboratory-scale studies include ozone oxidation as a replacement for carbon column effluent polishing and break point chlorination for nitrogen removal.

2. Combined Sewer Systems - D.C.

In June 1968, the Federal Water Quality Administration approved a contract with the consulting engineering firm, Roy F. Weston, to help define the problems of combined sewer discharges within the District of Columbia;

investigate the feasibility of high-rate filtration for the treatment of combined sewer overflows; and to study alternative methods of solution to the problem. The project is nearing completion and the final report is being prepared.

### 3. Kingman Lake Area, Anacostia Park

On October 8, 1969, Secretary of the Interior Walter J. Hickel announced combining the features of stormwater treatment and recreational development in the Kingman Lake area of Anacostia Park. The project will treat overflow from the Northeast Boundary Trunk combined sewer and make-up water from the Anacostia. The plant output will be discharged into a series of small lakes. The first lake following treatment will contain aesthetically attractive aerators and can be used for fishing and boating. The second lake will be utilized for bathing.

The engineering studies have been completed and the final report is being printed.

### 4. Piscataway Advanced Waste Treatment Facility

This demonstration project, to be located at the Piscataway waste treatment plant, became active in June 1969 when an original FWQA grant of $1,650,000 was supplemented by a grant of $750,000 to permit construction of a full-scale advanced waste treatment plant, utilizing techniques developed at Blue Plains. The facility will employ 2-stage "high lime" treatment with intermediate recarbonation, dual-media gravity filters, stabilization and carbon adsorption with regeneration. The detailed design was completed on April 10, 1970; bids were opened in June 1970, and because of overruns, a Section 8 supplemental grant was awarded on October 29, 1970. Contracts have been recently awarded for the model plant and the centrifuge. The remaining contract for the regeneration furnace is expected to be awarded by December 31, 1970. Construction is expected to be completed by December 31, 1971.

### 5. Transportable AWT Plant for Interim Use

On July 29, 1970, a grant was awarded to Fairfax County, Virginia, to construct and operate an AWT plant that could be used for interim situations where additional capacity was needed to relieve overloaded treatment works, pumping stations, or collection systems until a permanent solution could be completed. Another important application of the AWT plant could be to serve subdivisions or developments that are beyond regional interceptor systems and a planned delay exists for such interceptors so that community expansion can be more realistically controlled.

The treatment system design is for complete treatment including nitrogen and phosphorus removal with performance criteria based on Potomac River Enforcement Conference recommendations for Zone 1 of the river. Detailed designs have been completed and notice of intent to award given for construction of the unit. The contract calls for completion of an operating 75,000 GPD plant by April 1, 1971.

Mr. Chairman, I would like to break at this point to introduce four reports and then return to make some recommendations for consideration by the conferees.

First, may I introduce Mr. Johann Aalto, who will report recent findings of the Chesapeake Technical Support Lab that may have bearing on the conference area.

## STATEMENT OF

JOHANN AALTO, CHIEF,
CHESAPEAKE TECHNICAL SUPPORT LABORATORY,
ENVIRONMENTAL PROTECTION AGENCY, WATER QUALITY OFFICE,
ANNAPOLIS, MARYLAND

MR. AALTO: Mr. Chairman, conferees, ladies and gentlemen. I am presenting a statement which will be available to all of you and which the conferees have in hand now which summarizes the findings of the Chesapeake Technical Support Laboratory on Potomac River water quality since our last presentation.

A detailed study of the interrelationships among wastewater discharges, water supply withdrawals from the estuary, freshwater inflow, and water quality was undertaken in November 1969. This study has a twofold purpose: 1) to further refine wastewater treatment requirements for Zones I, II, and III of the Upper Potomac Estuary (see Figure I) and 2) to determine the feasibility of using the estuary as a municipal water supply source. The latter was conducted in cooperation with the U. S. Army Corps of Engineers. The preliminary study findings as related to wastewater management are presented below:

1. Since the summer of 1969, the high fecal coliform densities previously observed near the sewage treatment facility discharges in the Upper Potomac Estuary have been significantly reduced by continuous chlorination of the wastewater effluents. At present, during low-flow conditions, the major contributions of bacterial pollution in the upper estuary are from the combined sewer overflows

upstream from Hains Point.

2. During the period from mid-August to October 1970, low dissolved oxygen concentrations (often below 1.0 mg/l) were measured in the upper estuary from Hains Point to Marshall Hall.

3. In 1970, large populations of bluegreen algae were again prevalent during the months of June to October in the Potomac Estuary from the Potomac River Bridge to Hains Point. As the freshwater inflows decreased in August and September, the populations became very dense including the first observed nuisance growths near Hains point and within the Tidal Basin. To prevent noxious odors in the vicinity of the Jefferson Memorial, the algal growths were manually removed from the Tidal Basin.

4. Currently, the approximately 325 mgd of wastewater discharged from 18 major treatment facilities contributes 450,000, 24,000, and 60,000 lbs/day of ultimate oxygen demand* (UOD), phorphorus, and nitrogen, respectively, to the waters of the Upper Potomac Estuary.

5. During the summer months, more ultimate oxygen demand (over 50,000 lbs/day) is added to the waters of the Upper Potomac Estuary as a result of algal growth than from

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*Ultimate oxygen demand is the sum of 1.45 times the 5-day biochemical oxygen demand and 4.57 times the unoxidized nitrogen.

any other course, including wastewater discharges.

6. Under low-flow conditions, the major source of nutrients (including that from wastewater effluents and land runoff) is locally treated municipal sewage. Approximately 88, 90, and 96 percent of the ultimate oxygen demand, nitrogen, and phosphorus, respectively, is from wastewater discharges.

7. During warm temperature periods, it has been determined that if the upper concentration limits of inorganic nitrogen in the estuary are maintained between 0.3 and 0.5 mg/l as N and the upper phosphorus limits ot 0.03 to 0.1 mg/l as P, the algal standing crop can be reduced below nuissance levels. The lower concentrations of the upper limits of the nitrogen and phosphorus ranges given are applicable to areas such as the middle reach of the estuary and the embayments where growing conditions are more favorable, whereas the higher concentrations are for the upper portion of the estuary where light penetration limits algal growth.

8. The projected populations, wastewater volumes, and loadings (before treatment) for the Washington metropolitan area follows:

| Year | Population | Flow (mgd) | BOD5 (lbs/day) | Nitrogen (lbs/day) | Phosphorus (lbs/day) |
|---|---|---|---|---|---|
| 1969 | 2,800,000 | 325 | 483,500 | 63,500 | 27,300 |
| 1980 | 4,000,000 | 475 | 823,500 | 95,600 | 43,100 |
| 2000 | 6,700,000 | 860 | 1,463,500 | 155,700 | 70,300 |
| 2020 | 9,300,000 | 1,340 | 2,195,000 | 215,600 | 97,400 |

9. Based upon the study of wastewater projections and the recently adopted "Memorandum of Understanding" on metropolitan Washington's wastewater treatment objectives, the following can be concluded:

A. Between the years 1980 and 2000, the Potomac (Dulles) Interceptor, with its current capacity of 65 mgd, will be overloaded,

B. To provide for future wastewater collection and treatment facilities in the areas currently projected to be served by the Potomac Interceptor, either the capacity of the interceptor should be significantly increased or wastewater treatment facilities constructed on the Potomac River above Washington,

C. With Blue Plains being limited to 309 mgd, a need exists not only for a facility or facilities to serve the Anacostia Valley but also a portion of the Upper Potomac area currently being served by Blue Plains via the Dulles Interceptor, and

D. Large wastewater volumes are projected in the Occoquan and Pohick watersheds in the Virginia counties downstream from Washington, indicating a need for long-range water resources planning in this area.

10. Three basic alternative wastewater treatment systems were investigated to determine the effects of discharge locations on the receiving water quality including chloride and total dissolved solids intrusion:

A. Alternative I consisted of the following plants: Pentagon, Arlington, Blue Plains, Alexandria, Piscataway (also serving Andrews Air Force Base), Lower Potomac (serving Pohick, Accotink, Dogue, and Little Hunting Creek watersheds including Ft. Belvoir), Mattawoman, Neabsco (serving the Occoquan watershed), and Port Tobacco;

B. Alternative II consisted of the nine facilities as in Alternative I plus a facility serving the Anacostia Valley located just above the Maryland-D.C. line; and

C. Alternative III consisted of the same facilities as Alternative II plus an Upper Potomac plant discharging near Chain Bridge serving the Upper Potomac region in Virginia and Maryland.

Also investigated were two other alternative systems -- IV and V -- which were identical to III, except that all effluents were discharged into the main channel of the Potomac for Alternative IV while all discharges were conveyed downstream to a point below Indian Head, Maryland for Alternative V. These two alternatives were used to evaluate wastewater discharges to the main channel of the Potomac and to investigate the rate of salinity and total dissolved solid buildup and intrusion from the Chesapeake Bay as part of the water supply study.

11. For waste discharges into the main channel of the Potomac, ultimate oxygen demand loadings to the upper three 15-mile zones have been further defined as follows: The loadings are based on: 1) an average inflow of 1300 cfs at Great Falls before water supply diversions*, 2) a temperature of 29.0° C, and 3) an aerated effluent with a dissolved oxygen content of 6.0 mg/l.

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*For the years 1980, 2000, and 2020, and an average discharge of 1800 cfs at Great Falls, the flow into (+) or withdrawn from (-) the estuary after meeting the maximum monthly water supply needs are +690, -220, and -1340 cfs, respectively. The 1800 cfs or twice the unregulated 7-day low flow with a recurrence frequency of once-in-10 years is the 30-day low flow attainable at Great Falls when the seven proposed reservoirs are operational.

UOD Zone Loadings

| Zone | UOD Loadings* (lbs/day) |
|---|---|
| I | 76,000 |
| II | 180,000 |
| III | 350,000 |

12. For conditions similar to those in the above table, allowable UOD loadings for discharges into the Upper Anacostia, Piscataway, and Gunston Cove tidal embayments have been developed for the projected wastewater volumes as follows:

UOD Loadings

| Year | Anacostia (lbs/day) | Piscataway (lbs/day) | Gunston Cove (lbs/day) |
|---|---|---|---|
| 1980 | 3,000 | 10,000 | 7,000 |
| 2000 | 6,000 | 10,000 | 11,000 |
| 2020 | 9,000 | 12,000 | 16,000 |

The higher UOD loadings for 2000 and 2020 are a result of increased transport and assimilation due to increased wastewater flows.

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* The poundage developed for a given zone represents the maximum allowable loading assuming that the loadings established for the other zones are not exceeded. This loading concept applies not only for UOD but also phosphorus and nitrogen.

13. Using an average freshwater inflow of 1800 cfs over Great Falls before water supply diversion and wastewater discharges into the main channel of the Potomac, the allowable loadings of phosphorus by zones for algal control were determined based upon maintaining an average maximum of 0.1 mg/l in Zone I and 0.06 mg/l Zones II and III as follows:

Phosphorus Loadings (lbs/day)

| Year | Zone I | Zone II | Zone III |
|---|---|---|---|
| 1980 | 1400 | 1800 | 2800 |
| 2000 | 1350 | 2400 | 3000 |
| 2020 | 1500 | 2500 | 4300 |

The increase in the loadings for the years 2000 and 2020 is a result of increased dispersion and transport due to greater wastewater volumes and increased water supply withdrawal from the estuary.

14. Allowable phosphorus loadings for projected discharges into the Upper Anacostia, Piscataway, and Gunston Cove tidal embayment are presented below:

Phosphorus Loadings as P

| Year | Anacostia (lbs/day) | Piscataway (lbs/day) | Gunston Cove (lbs/day) |
|---|---|---|---|
| 1980 | 85 | 35 | 35 |
| 2000 | 135 | 50 | 60 |
| 2020 | 180 | 65 | 140 |

As for UOD, the increased loadings for 2000 and 2020 are a result of increased transport and assimilation due to increased wastewater flows.

15. Using maximum inorganic nitrogen concentrations of 0.5, 0.4, and 0.3 mg/l in Zones I, II, and III, respectively, for algal control and other conditions as specified in Conclusion 13, maximum nitrogen loadings were determined as follows:

Nitrogen Loadings (lbs/day)

| Year | Zone I | Zone II | Zone III |
|---|---|---|---|
| 1980 | 4500 | 6000 | 8400 |
| 2000 | 3600 | 6000 | 8400 |
| 2020 | 4000 | 6000 | 9100 |

As also indicated in Conclusion 12, the changes in loadings are a result of increased waste volumes and water supply withdrawals from the estuary.

16. The allowable nitrogen loadings for discharges into Upper Anacostia, Piscataway, and Gunston Cove tidal embayments are given below:

Nitrogen Loadings as N

| Year | Anacostia (lbs/day) | Piscataway (lbs/day) | Gunston Cove (lbs/day) |
|---|---|---|---|
| 1980 | 300 | 120 | 130 |
| 2000 | 550 | 170 | 270 |
| 2020 | 800 | 270 | 460 |

Johann Aalto

17. Based upon detailed analyses of the Anacostia, Piscataway, and Gunston Cove tidal embayments including dye studies, it appears that the effluents of major discharges into the upper portion of small tidal embayments such as Neabsco Creek, Four Mile Run, and Hunting Creek should have a maximum concentration of UOD, phosphorus, and nitrogen of 10., 0.2, and less than 1.0 mg/l, respectively.

18. The present worth cost of additional wastewater treatment including operation, maintenance, and amortization for the time period from 1970 to 2020 has been estimated to be $1.2 billion with a total average cost of $54.8 million. The unit treatment processes considered include activated sludge, biological nitrification-denitrification, lime clarification, filtration, effluent aeration, and chlorination.

On a per capita basis, the cost of the wastewater treatment is presented below:

| Item | 1970-1980 | 1980-2000 | 2000-2020 |
|---|---|---|---|
| Average Population | 3,350,000 | 5,350,000 | 8,000,000 |
| Initial Capital Cost/Person/Year | $10.80 | $ 4.90 | $ 7.30 |
| Operation and Maintenance Cost/Person/Year | 7.50 | 8.60 | 9.10 |
| Total Cost/Person/Year | $18.30 | $13.50 | $16.40 |

19. To incorporate the projected increases in population, change in the wastewater treatment systems, and refined calculation of the maximum loadings for UOD, phosphorus, and nitrogen by zones, a need exists for a formulation capable of allocating the pound loadings per facility within a specific zone. It appears that a dynamic formulation can readily be developed using 1) a uniform treatment policy concept within a zone, 2) the projected pound loadings for a given zone before treatment, and 3) allowable maximum loadings for the given zone.

## PART II. OTHER CURRENT AND PLANNED STUDIES

### 1. Water Resources-Water Quality Study

A report on this study, from which parts were excerpted in Part I, is currently being prepared. Included in this report is a detailed analysis of water quality trends and ecological successions, treatment requirements including an investigation of alternative wastewater treatment systems, estuarine water supply withdrawal potential, and treatment costs.

Two technical reports, one entitled "Nutrient Transport and Dissolved Oxygen Budget Studies in the Potomac Estuary" and the other "Mathematical Model Studies in the

Upper Potomac Estuary," are being documented as part of the development of the data for the Water Resources-Water Quality Study. In these two reports, detailed descriptions of the various phases of this investigation are presented.

2. Other Current Studies

To aid in further defining waste treatment requirements, especially in the middle and lower reaches of the estuary, and to further document the effects of pollution stresses on estuarine water quality and designated water uses, the following areas are currently being investigated:

a. Phytoplankton and other higher trophic level successions as they are related to nutrient enrichment, including annual ecological cycle variations,

b. Refinement of the techniques used to measure various aspects of eutrophication and ecological succession including algal standing crop by the chlorophyll a method,

c. Variations in phytoplankton communities in fresh, brackish, and saline waters, including possible effects on nutrient criteria,

d. Effects of low-oxygen levels on fish nursery areas,

e. Toxicity of the bluegreen algae, mainly *Anacystis*, and

Johann Aalto

f. Virus densities in the upper estuary as related to potential water supply use.

In conjunction with weekly water quality monitoring by the District of Columbia Government in the upper estuary and with routine monitoring by the Chesapeake Technical Support Laboratory in the middle and lower reaches, the six areas mentioned above are essential activities in investigating and monitoring the response of the Potomac Estuary to a water quality management program.

3. Planned

Mathematical modeling studies will be expanded to predict the effects of existing and proposed thermal discharges in the Potomac Estuary.

This just about summarizes the findings of our present study that have been pertinent to the Progress Meeting of the Enforcement Conference. It should be pointed out that the report that is presently in preparation will contain all the supporting data, that any changes that we have determined thus far from those findings previously reported are relatively minor. And this has been a team effort by our Technical Support Laboratory, by several of the people there who are present today; but

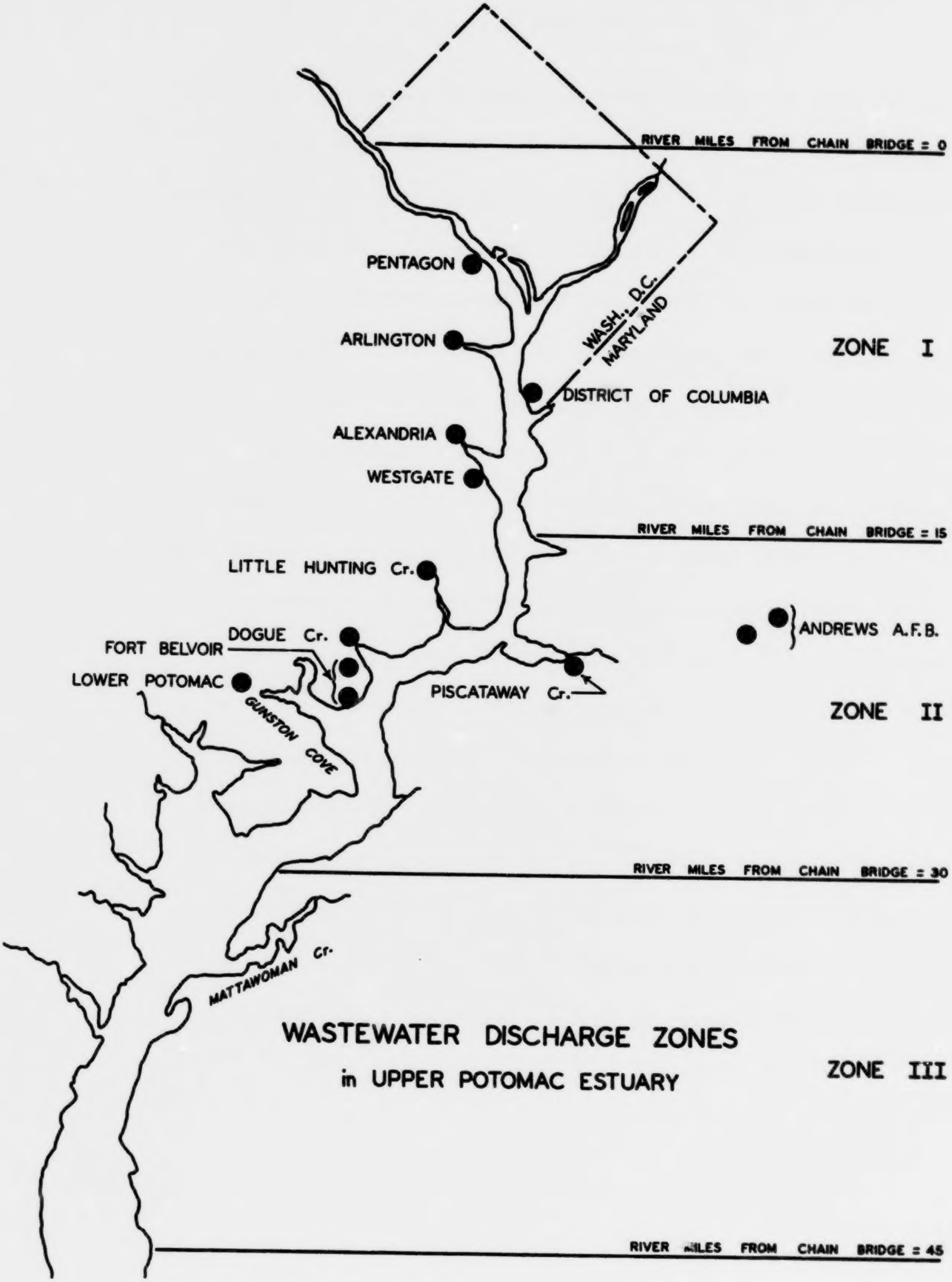
Johann Aalto

I would like to make a special point of pointing out that a great deal of credit goes to Dr. Jaworski for his innovative techniques that have been applied and successfully demonstrated in preparing this work. We have had the cooperation of the Council of Governments on population studies, the cooperation of the various other agencies that are vitally concerned with the work in the Potomac Estuary, including the D. C. Government, Washington Suburban Sanitary Commission, and the Corps of Engineers. And our Regional Office has been very helpful to us in some of the cross studies. The headquarters people have cooperated. The R & D people and the data processing people have been very helpful in the preparation.

So it has been a team effort by several groups. And I believe that as soon as we are able to present the report that is presently in preparation you will have substantial technical backup for all the statements that we have presented here today. I am sorry these are not ready yet, but copies of these statements are available.

Thank you.

(Figure 1 follows:)


RIVER MILES FROM CHAIN BRIDGE = 0
WASH., D.C.
MARYLAND
PENTAGON
ARLINGTON
ZONE I
DISTRICT OF COLUMBIA
ALEXANDRIA
WESTGATE
RIVER MILES FROM CHAIN BRIDGE = 15
LITTLE HUNTING Cr.
ANDREWS A.F.B.
DOGUE Cr.
FORT BELVOIR
LOWER POTOMAC
PISCATAWAY Cr.
GUNSTON COVE
ZONE II
RIVER MILES FROM CHAIN BRIDGE = 30
MATTAWOMAN Cr.
ZONE III
RIVER MILES FROM CHAIN BRIDGE = 45

WASTEWATER DISCHARGE ZONES
in UPPER POTOMAC ESTUARY

FIGURE I

MR. STEIN: When will those be ready, Mr. Aalto?

MR. AALTO: We should be able to have the technical report ready, oh, possibly by the end of this month, Mr. Chairman.

MR. STEIN: Are there any questions or comments on this?

MR. BLAISDELL: Mr. Aalto, you made a couple of basic assumptions here, one with respect to population projections. You have used the low point of the projections or the low projections as obtained from COG; and the other is that you have made the assumption, of course, that there would be 1800 cubic feet per second of sustained flow coming in at Great Falls due to the construction of the seven core reservoirs in the Upper Potomac. How do each of these affect your findings? In other words, if we took the high population figures what effect would they have on your data if we assume that the reservoirs were not filled? What effect would it have?

MR. AALTO: As far as the population projections are concerned it would merely mean moving up the timetable for construction of these various facilities required to achieve the water quality standards that have been adopted. It is merely a rescheduling of the operations.

We have cooperated with the Council of Governments on this population projection, and this seems to be the most practical value that we can use for this purpose.

As far as the 1800 cubic feet per second is concerned, we find that as time goes on, the amount of water flowing over Great Falls becomes a lesser factor in our calculations, because of the fact that water that is used and returned to the estuary provides the transport. Whether the source of water is the Potomac River itself, or from some entirely different source, if these populations are to be maintained the water will have to come from somewhere. And consequently the discharge will be made to the Potomac Estuary. So in effect we are creating a transport by waste discharges in the Potomac River which is independent of the source of water.

Does that answer the question, Mr. Blaisdell?

MR. BLAISDELL: Well, if I understand it properly, if you had a low flow condition in the Potomac you would be depending upon more waste effluent or the waste effluent being returned to the system. In other words, it would be sort of a recirculation.

MR. AALTO: That's right. This investigation includes withdrawals of various amounts and even includes a negative flow to the extent that so much water is taken out of the estuary at some point in the future that the amount of water flowing over Great Falls isn't enough to take care of the withdrawals and the water in consequence would have to come from what you could call the upper estuary freshwater pool.

MR. BLAISDELL: Either higher population figures or low flows in the streams, your percentage of removal has to increase, doesn't it, if you obtain these same loadings?

MR. AALTO: Yes, sir. We have tried to avoid the use of percentage figures as much as possible. I know that our figures have been available. The agencies that are involved in planning are familiar with what we are doing and they can readily translate these figures to percentage removal.

It follows that if so many pounds of discharge can be made into a zone, the more people that are involved the higher degree of removal would have to be achieved in the treatment process.

MR. BLAISDELL: Well, this is the point I am trying to bring out -- that due to our discussion yesterday, the first thing we have to do today, or the conferees should determine if the standards that you set here in paragraph 7 are acceptable and adequate; and from those, of course, we determine and establish the loadings and then there would have to be a distribution of those loadings to facilities within the zone.

MR. AALTO: That's right, sir. All we can do is to look at what seems to be the projected disposition of sewage treatment plants and apply the population projections to those. Our mathematical model would make it a very simple matter if there were some other point discharges determined than those that we have assumed; we can readily determine the effect on the estuary. But for those assumptions which we have given -- and they are just our assumptions based on what seems to be likely to happen -- we have worked out these figures, and the change in total loadings will be relatively insignificant regardless of what disposition is made of these point source discharges.

In other words, the conferees have the prerogative of determining whether or not the loadings will be permitted to go to this maximum figure that has been determined upon a technical basis. They also have the prerogative of determining the distribution of these discharges, whether by projected population, by governmental subdivision, or whatever method they use. This is the prerogative of the conferees.

MR. STEIN: Are there any other comments or questions?

Mr. Hope.

MR. HOPE: Mr. Aalto, to go back to your report, in paragraph 6 you indicate that 90 percent of the nitrogen and 96 percent of the phosphorus comes from wastewater discharges, and conversely 10 percent of the nitrogen present in the Potomac waters and 4 percent of the phosphorus is naturally occurring. It is in the water when it reaches the District?

MR. AALTO: Let's say it comes from other sources, which would include local land runoff and also upstream sources, which could include land runoff upstream as well as treated waste from upstream sources.

MR. HOPE: No disagreement. I understand. Now my question is this: What levels of concentration of phosphorus and nitrogen will this result in during periods of low flow in the Potomac River? Will we be below the critical levels that you define in the following paragraph 7?

MR. AALTO: I don't fully understand your question, Mr. Hope.

MR. HOPE: Assume for the moment that we removed all of the nitrogen and all of the phosphorus from all of the wastewater discharges within the area, what would be the levels then of nitrogen and phosphorus in the Potomac during periods of low flow?

MR. AALTO: I don't have the figures offhand. I am sure Dr. Jaworski has them. My impression is, while we may have figures that would be moderately high, as the nitrogen and phosphorus comes in, the dilution, as the flow reaches the estuary, would be such that they would not reach a problem level as far as stimulation of algal growth is concerned.

MR. HOPE: In other words, we would be below those critical levels?

MR. AALTO: In the estuary, yes, sir. It might be that for phosphorus we would be just at the critical level at Great Falls, but when the flow reached the estuary the nutrient concentrations would be below these critical levels that we have established. For phosphorus, for example, in the zone we had a figure of a tenth of a milligram per liter as a maximum permissible level in order to control algal growth, and that is just about the figure, as I recall it, that comes over Great Falls during this period.

MR. HOPE: Thank you.

MR. STEIN: Are there any other comments or questions?

(No response)

Let me take you back right to the beginning, Mr. Aalto. You talked about fecal coliform densities significantly reduced by continuous chlorination of wastewater effluents. That is one thing presumably that you got by observation and not by using the --

MR. AALTO: No, this is done by actual sampling and observation.

MR. STEIN: I know that. That's why I am interested in that particularly. How far down did you get these frequent concentrations?

MR. AALTO: Generally speaking, they would go somewhat below Woodrow Wilson Bridge.

MR. STEIN: I am talking about numbers. How far were they knocked down?

MR. AALTO: Well, this is very difficult to say, Mr. Chairman, because this is a quantity that varies highly. It is a seasonal variation, and I suppose it is a function of how frequently we have combined sewer overflows.

MR. STEIN: I am not talking about the combined sewer overflows. We will get to that in a moment. But you say that the high fecal coliforms have been significantly reduced. Significantly reduced from what to where? I assume we are not operating under the situation like we get on T. V. ads, things are smoother and better and milder -- how much?

MR. AALTO: Actually the previous report that we made -- I believe it was in the spring of 1969 -- shows that except for a single location that could be identified as rather close to the District of Columbia discharge, we had fecal coliforms reduced to below the level that had been set by the State of Maryland standards.

MR. STEIN: For what?

MR. AALTO: For E. coli fecal coliforms.

MR. STEIN: For what kind of use?

MR. AALTO: Recreational use.

MR. STEIN: Recreational use except for full immergence in swimming.

MR. AALTO: Yes.

MR. STEIN: Oh, it is below 240?

MR. AALTO: Yes, sir. Now we find except for a single point which seemed to be related rather closely to the location --

MR. STEIN: 240 is very low.

MR. AALTO: It was, sir.

MR. STEIN: But this is a point that I am getting at, and I am asking these questions for a point. Have you talked in terms of -- presumably this wouldn't happen after a rain or when we had stormwater?

MR. AALTO: It didn't apply then, no, sir.

MR. STEIN: All right, now here is the question. As I understand it, when we get down to something like 240 that may be a standard to use for this in possibly swimming-pool water. So far as a bacterial content is concerned this is pretty good. Now we heard from Dr. Falkow yesterday of Georgetown University, who talked about someone putting out a regulation prohibiting all recreational use of the river and coming into contact with the water. It seems to me that what you have given us here indicates, for example, that the water except after rain, in most cases, might be better than vast areas such as Coney Island as far as bacterial content is concerned. I am just trying to relate these together, if this is what you mean.

MR. AALTO: Mr. Chairman, I would like to point out that this is the area where the major discharges occur. This is the area generally from Hains Point downstream. But the area from Hains Point upstream this does not apply. It did not apply to some extent even in the spring of 1969. But especially today we find consistently high fecal coliform counts, and Dr. Falkow's figure of 3,000 is not unrealistic. And this was confirmed by Mr. Hope yesterday. This does exist in the area, oh, roughly Theodore Roosevelt Island, but the area where the major treatment plant discharges are have been significantly improved as far as fecal coliform counts are concerned over the past.

MR. STEIN: In other words, what you are saying, there was still a high fecal count in the river. Really again, when we are talking in terms of cleaning up water or water pollution, it is where the people use the river and come into contact with the river. What you are saying then is that you agree with Dr. Falkow that there are still high coliform counts in that river?

MR. AALTO: Yes, sir, in the area we are talking about. In the area above Hains Point this is true, it has been consistently high, and more so during this past year than in previous years.

MR. STEIN: How is that ever going to be reduced, by treatment plant and disinfection, or are we still going to have these high counts even if we put in treatment plants and disinfection?

MR. AALTO: Well, the treatment plant won't help there. What will have to be done there is eliminate the combined sewer overflows, for example, by completion of the Project C that was planned, or to provide local treatment for stormwater overflows, which is possible.

MR. STEIN: Well, do you think that this completion of Project C and closing the Georgetown gap would knock these coliform counts down?

MR. AALTO: They would knock the coliform counts down some of the time because there are times when you have rainfall --

MR. STEIN: Let's assume that. Will they knock the counts down during periods except after periods of rainfall and overflow?

MR. AALTO: Yes, sir, as far as we have been able to determine, the sources are the combined sewer overflows. If they are eliminated by providing adequate interceptors there should be no high fecal coliform counts.

MR. STEIN: And would you estimate that it might be even in the area above Hains Point down to maybe about 240, or below a thousand?

MR. AALTO: This is a little difficult for me to do, Mr. Chairman. I would say this could be achieved if all combined sewer overflows are eliminated. We have to realize that we do have a surface runoff which doesn't appear in stormwater overflows and in the combined sewer overflows that might contribute something to it. We are not prepared to say; this would take a much more detailed survey than we have been able to undertake.

MR. STEIN: The only reason I am asking you, you are making some pretty good projections on the basis of assumptions. I thought maybe since we had all these figures maybe you could assume this, too, but I guess you can't.

MR. AALTO: We stay in the area of our competence, I believe, Mr. Chairman.

MR. STEIN: No, I don't know whether it is the area of competence. It is the area where you feel comfortable in making assumptions. You are ready to make assumptions in one area but not in another. This is a problem a lot of the people have with these models, and I don't say this in any derogatory way. I don't know why you feel more secure in the assumptions you made -- flow temperature and population -- than on these assumptions. And yet you are basing a whole theory on assumptions you have made to support your mathematical model.

MR. AALTO: Mr. Chairman, we can measure accurately our point source discharges. There we feel competent with the results. But when you have a nonpoint source discharge, an area runoff that doesn't come in through either combined sewers or stormwater sewers unless there were more detailed investigation made than we have been able to do thus far, we have less competence in making these projections regarding fecal coliform counts.

MR. STEIN: I agree with you completely, but those nonpoint discharges apply to zones I, II, and III in which you have made the assumptions on having water quality which is going to meet the standards.

MR. AALTO: Yes, sir, but you must remember our mathematical model operations have been based on actual sampling measurements done in the Potomac Estuary. So this does measure the nonpoint source discharges as well as the point source discharges.

MR. STEIN: I understand that. There probably has been more sampling done on coliform bacteria than any other single thing, and if you can't make an assumption there but you can make it on others -- but I don't know that we have to get that.

Let me get to another point or two. One of your assumptions is that you are going to have a temperature of 29 degrees Centigrade. Is this year round?

MR. AALTO: No, no, we take the low flow conditions. We take the critical times as a basis of making the determination, and naturally if we take those times of the year when the flow is higher and temperature is lower the readings then are not as critical as they are during the critical times. Our concern with nutrients is the temperature at which the algal growth is stimulated to a maximum extent.

MR. STEIN: I understand. I am asking when you talk about 1800 cfs at Great Falls, temperature of 29 degrees Centigrade, and an aerated effluent, you are considering the effect in the critical low flow periods, is that correct?

MR. AALTO: Yes, sir, that is true. At the same time, as I mentioned earlier, that 1800 cubic feet per second as a minimum flow -- this is based on a regulated flow by construction of reservoirs -- is not quite as critical as it appears because our mathematical model work has assumed we have considerably higher withdrawals. So that the net flow -- this is the total flow before water supply withdrawals -- the net flow in some of our assumptions have been that we exerted a negative flow; that is, we created a flow from the estuary upstream instead of the normal downstream flow.

MR. STEIN: Some of the other conferees asked you questions on that, but what I am trying to zero in on, Mr. Aalto, is your assumption as to temperature, not your flows. We got your ideas on the flow. Now how much will this temperature be in Fahrenheit?

MR. AALTO: I need a slide rule for that.

MR. STEIN: You do?

MR. AALTO: We divide it by 5, miltiply it by 9, and add 32.

MR. STEIN: Well about how much?

MR. AALTO: A little over 80.

MR. STEIN: 80 or 84?

MR. AALTO: And that is quite warm.

MR. STEIN: And you figure the low flow will probably happen in August?

MR. AALTO: Or September.

MR. STEIN: All right, again as you know, you run into problems on these temperature variations on this. Now let's see if I understand one of the assumptions. In dealing with your embayments you have raised the amount of loadings which you are going to allow to go into places like Anacostia, Piscataway, and Gunston Cove in the year 2000 and the year 2020 on the basis of their putting out a larger flow of water, of wastewater, and you say that this is going to give it increased transport and at least on UOD a simulation. In other words, you are relying on just the increased volume of waste to say that they can increase their waste loadings in terms of pounds?

MR. AALTO: That is about it, because as you create a flow you move most of the UOD nitrogen and phosphorus further downstream, and as it moves out of the area you don't have a buildup to levels that would be an excessive stimulant to the algal growth.

MR. STEIN: That's what I figured. The more waste we are going to put out the more you are going to allow us to put in.

MR. AALTO: To some extent, sir. If you look at the figures you can't help seeing this, and it surprised us, but this is the way it does work out.

MR. STEIN: Now on your costs have you done this $1.2 billion -- you say this is -- is this based on present costs or projected increase?

MR. AALTO: This is present costs.

MR. STEIN: So if we talk in terms of the year 2020 this kind of figure based on present work costs isn't really realistic, is it? What are we going to do with that?

MR. AALTO: This is the only way. We have no idea of what the effects of inflation will be. We have to reduce this to a value that we can determine and standardize upon.

MR. STEIN: Well, I don't know. There are several ways of standardizing. People have had through the years projected increases in construction costs, but you haven't taken that into account in these projections at all.

MR. AALTO: We have used the data by our economic section people in determining these figures. The cost we determined from our research and development --

MR. STEIN: No, I am not arguing about your getting the data. We are talking about your basic assumption, and you are giving the economic projection based on present cost, just so we understand what you are doing.

MR. AALTO: Yes.

MR. STEIN: Now let me get at one last point here. You talk in terms of an estuarine water supply withdrawal. When are we going to do this and, in other words, get the water in the estuary? We are not doing this now, are we?

MR. AALTO: No, sir. We came rather close to it, I believe it was last year, when the Corps of Engineers was ready to set up a barge and pump 50 mgd.

MR. STEIN: Why are you assuming that?

MR. AALTO: Because we have been working rather closely with the Crops of Engineers, and their consulting engineers have presented a preliminary report which says this is to be the feasible supply of water for Washington.

MR. STEIN: Now you assume it is 1800 cfs. Does that assume dams?

MR. AALTO: That assumes dams.

MR. STEIN: You made an assumption you are going to assume dams and we are going to have to use the estuary for water supply and not the water supply from those dams?

MR. AALTO: Yes, sir, it is absolutely essential that both sources be available unless -- the only alternative would be to construct the old 13 or 14 dams originally proposed, and from our understanding it is not likely --

MR. STEIN: So your projection is, in spite of all the dams you are asking for authorized in the upper estuary, we are still going to have to use or have available the water below Great Falls in the estuary for water supply in the metropolitan area during critical periods.

MR. AALTO: In spite of the fact that seven dams are constructed it will be necessary to use the estuary. If they go to 14 that is another thing again.

MR. STEIN: I have no further questions here, but I think it is fair to say that there are a lot of assumptions that have to be looked at very carefully.

MR. AALTO: Well, the Corps of Engineers has presented a preliminary report already.

MR. STEIN: I am not talking in terms of just a single factor in here of assumptions.

Are there any other questions or comments?

Mr. Jackson.

MR. JACKSON: Mr. Chairman, may I ask a question of Mr. Aalto? Is it your understanding that to make the upper estuary a feasible source of water supply, construction of at least the seven dams is essential?

MR. AALTO: I don't think that is a question that is within my province to answer. I have my own personal opinion, but this is a decision of the Corps of Engineers, and this is entirely feasible.

MR. STEIN: Could we have your personal opinion, or don't you want to give it? It is a free forum.

MR. AALTO: I don't care to give it. I will give it to you privately.

MR. JACKSON: I really wasn't asking for a personal opinion. It was my understanding that was a contingency in the initial issuance of the report itself -- that is the preliminary report -- this was a contingency, and I was asking really for confirmation of that understanding.

MR. STEIN: Well, I think this is a fundamental issue, as far as I see it, and it affects this conference rather critically. That is, if we are going to have a dam program on the Potomac River, as they have on most other major streams in the country, we know that the dam program also provides a water supply. If this dam program is not going to provide a water supply and the metropolitan area is going to depend on the estuary for the water supply and we have to maintain a quality -- and this includes the hard stuff to get out like salinity, too -- we are going to have to maintain quality with our program so that can be used as a source of water supply. I think that this is a consideration that the conferees have to really consider, because this is something we are going to have to address ourselves to if we are going to keep that estuary in shape for a water supply for which it is not being used now, for the future. And I think that is a very fundamental question.

Thank you very much, Mr. Aalto.

MR. HADDER: May I ask a question, Mr. Chairman?

MR. STEIN: Yes.

MR. HADDER: Mr. Aalto, what is the significance in using an average inflow of 1800 cfs rather than a minimum flow of some figure?

MR. AALTO: Well, let's call it an average minimum flow. How is that?

MR. HADDER: I don't know.

MR. STEIN: No, that was the question -- do you mean minimum? Mr. Aalto, I asked the same question, and that's why I was confused when I asked you do you mean minimum with this eighteen or not.

MR. AALTO: You have to remember that when we talk about 1800 cfs this is before water supply withdrawals. In fact, there will be no water coming over Great Falls under extreme use, so this is not really a minimum flow into the estuary. This is the minimum flow that the regulation of the seven upstream dams, proposed for construction by the Crops of Engineers, will achieve. This is entirely feasible. But this is before withdrawal of water for water supply purposes. So when you talk about minimum flow into the estuary then this is a function of the amount of water withdrawn for water supply use. We have explored several amounts to see the effects on water quality. But we are not prepared to state now exactly what this would be. This is a water supply problem, not a water quality problem.

MR. STEIN: Do you understand that, Mr. Hadder?

MR. HADDER: I doubt it.

MR. STEIN: I don't understand that either. Again, let me try to say this advisedly. You know, you gave everyone credit for cooperating in the mathematical model except us. I don't feel bad. But we are supplying the money. I really believe in it, but I think you have to come up with assumptions that are understandable for the people who are going to evaluate these things. I don't believe neither Mr. Hadder nor myself should put words in your mouth. The point is, if the essence of the mathematical model is based on these assumptions, you must provide the assumptions and the computations in a way that can answer the questions of the people who are going to make judgments on this, so that I think this is a job for the people developing it.

I am sure you have an explanation of this. But I think you have to work at an explanation that can be understood by people like us sitting here.

MR. AALTO: This information, all the data used in these computations will be available when we have the technical report completed.

MR. STEIN: I know it will be available. The question here is just making it available does not mean we are going to be able to understand it or ask our questions. The point is -- what I am saying, that unless we can provide a direct answer to Mr. Hadder on that question on the flows, we have a real problem with the projections on the model. We just have to be able to provide it if we are going to sell this stuff.

MR. AALTO: We have a direct answer. The direct answer I gave earlier is that in spite of the fact that this amount of flow is provided by the seven dams, this is not a critical matter. We find that in the generation of this additional flow because of treated waste discharges the amount of water coming into the estuary assumes a lesser role, so that it is not quite as critical as it might appear on the surface.

MR. STEIN: Sir, I don't want -- and let's not prolong it, because I think you better go back and look at this again. The point is that he asked you if this were average or minimum, and you said it wasn't important. Then you say you used this as one of your assumptions. If it isn't a critical matter, why do you use it as an assumption? In other words, the purpose in answering one of these questions is not to raise more doubts than the original question.

I do think really you people had some firm notions in mind, but I think this is a question of getting this formulated so that the conferees can understand it. I know just standing up there without thinking about it, you are probably not going to be able to do this. Why don't you people try to get this lined up, and at another meeting or sometime later on we will try to work this out?

MR. AALTO: We will do this. If I can add something, Mr. Chairman, in order to make our first determination, our first runs on the methematical model, we had to make the assumption. It was only after we made the runs that this assumption was not a critical assumption -- that it was not quite as important as it appeared to us in the beginning.

MR. STEIN: All right.

MR. HOPE: Mr. Chairman, I think we have oversimplified the question of the use of the upper estuary as a source of water supply for the District. As I understand it, the studies have not come up with any categorical answers as to the problems that may be involved in the waters that are returned to the estuary from the District treatment plant. There still remains the question, too, of the possibility of some long-range toxic effect that may be present from nondegradable chemicals that would be present in those wastes, over and beyond what are normally covered at the moment in the Public Health Service drinking water standards.

So that before we take that considered risk of using the upper estuary as a source of water supply, I think we need a lot more answers than we will be able to get out of the meeting this morning.

MR. STEIN: I would certainly agree with that. And let me state this here. As I sense it, the conferees have certainly not bought the assumption that the upper estuary is to be available as a source of water supply.

And I will give you a personal judgment. As far as I am concerned, it is going to take a lot more convincing for me to agree to it.

Thank you, Mr. Aalto.

MR. COCK: Mr. Chairman I thought we made clear that was a preliminary report. I think sometimes our people become a little too cooperative sometimes prematurely. I think the full report will probably be very clear to those that have an opportunity to read it.

Before I go on I would like to make it clear that the report you just heard was an FWQA statement and that the three following reports are reports of the subcommittees appointed by the conferees. Copies of these will all be available -- I was going to say on the registration desk at the back. I guess I don't need to say it.

At this time, I would like to introduce Mr. Royal Thayer of the Regional Office in Charlottesville, who will present an interim report of the study group organized under Recommendation 4.

## STATEMENT OF

## ROYAL C. THAYER,

## SANITARY ENGINEER, PLANNING AND EVALUATION OFFICE, ENVIRONMENTAL PROTECTION AGENCY, WATER QUALITY OFFICE, CHARLOTTESVILLE, VIRGINIA

Royal C. Thayer

MR. THAYER: I am Royal C. Thayer, Sanitary Engineer, Planning and Evaluation Office, Charlottesville, Virginia Regional Office, Water Quality Office, E.P.A.

Mr. Chairman, conferees, ladies and gentlemen. I would like to read at this time excerpts from the interim report applying to Recommendation 4. I believe that each of you conferees has a copy before you.

## 1. Introduction

Recommendation 4 of the May 1969, Potomac Enforcement Conference directed the FWQA, in cooperation with State, interstate, and local agencies, to initiate detailed analyses of alternate methods of meeting future water quality requirements and sewerage needs in the Metropolitan area and to report the results of these analyses to the conferees by January 1, 1971. At special meetings of the conferees in December 1969, and January 1970, a study organization and schedule for action on Recommendation 4 was drafted and approved.

The adopted study organization contained four major work elements under the general coordination of a secretariat. The secretariat role was assigned to FWQA. The four work elements of the study as originally adopted to accomplish Recommendation 4 were:

A. An informal study of regional operating agencies and an analysis of existing and alternative institutional arrangements for water pollution control management in the District of Columbia Metropolitan area to be made by FWQA for the use of the conferees as they see fit.

B. A long-term Future Needs Study to be performed by the Metropolitan Washington Council of Governments (MWCOG) with appropriate input from the short-term study groups and other agencies.

C. A Short-Term Planning Committee to identify existing problems and to direct and report on the work of the Task Forces.

D. Task Forces to receive problem assignments from the STPC to analyze these problems and to submit to the STPC appropriate reports of findings and recommendations.

II. Institutional Arrangements Study

A summary of an examination and evaluation of institutional arrangements has been prepared for the information of the conferees. The summary and conclusions of this study are attached. A full documentation of this evaluation is in preliminary draft form and will be available upon completion.

III. Long-Range Future Needs Study

Royal C. Thayer

The office of Water Resources Research has approved the funding of a research proposal by MWCOG entitled "Anaylsis of the Joint Interactions of Water Supply, Public Policy, and Land Development Patterns in an Expanding Metropolitan Area." This study should function concurrently with, and as a part of, the Recommendation 4 effort.

Concurrently, MWCOG has applied for an FWQA Research and Development grant to support a study entitled "Application of Systems Techniques to the Evaluation of the Joint Interactions of Water Pollution Control, Public Policy, and Land Development Patterns in an Expanding Metropolitan Area." This proposed study is contemplated to fulfill the intent of the Long-Range Future Needs Study requested in Recommendation 4. The proposal is currently undergoing a reevaluation and negotiation by FWQA with MWCOG to clarify the scope of work.

## IV. Short-Term Planning Study

As directed by the Conferees, the secretariat submits the following interim report on the progress of the Short-Term Planning Study. I would comment here that the committee will submit a final report on January 1. The Short-Term Planning Committee is composed of working level representatives of the conferees, who in turn have utilized local representation on the various task forces, all being coordinated by FWQA in its designated role of secretariat. The report of the STPC therefore represents the combined efforts of the various levels of government.

## A. Summary and Conclusions

Based on preliminary findings of the STPC, and subject to revision and extension in the final report, the following summary and conclusions are presented:

1. The operating agencies of all wastewater treatment plants in the conference area must take full advantage of current research programs considering advance waste treatment processes, including those being conducted at the DC-FWQA Pilot Plant facility, by applying this technology to specific problems.

2. There is a decided impact on the water quality of the estuary by combined sewer overflows and urban drainage. Recommendation 5 should be reworded with the intent of denoting definitive criteria and guidelines which will allow firm scheduling of corrective action.

3. There is a need to promulgate appropriate guidelines in the conference area for the design and operation of "fail-safe" facilities. The criteria established by the FWQA Interim Report, "Design, Operation and Maintenance of Wastewater Treatment Facilities," should be considered for this purpose.

4. Sludges produced by advanced waste treatment processes are expected to present additional problems in sludge handling and ultimate disposal in terms of volume and nature of sludges produced. Consideration should be given to a regional solution to this problem.

5. The "Preliminary Findings" of the FWQA Chesapeake Technical Support Laboratory study demonstrate the significant effect that the location of waste outfalls have on the water quality and water supply potential of the estuary. Therefore, the location of all waste discharges to the Potomac should be evaluated as indicated by the final report of the study and by additional use of the model.

6. A survey indicates that there are two plants in the area having site limitation problems. At the District of Columbia Water Pollution Control Plant at Blue Plains, unusual construction techniques will be required in order that the present site be adequate for the planned expansion and upgrading. Proposed upgrading at the Arlington Water Pollution Control Plant will require acquisition of additional land. The need is being studied by a consultant.

7. The "Preliminary Findings" of the CTSL study define the loading factors, criteria, magnitude and duration of withdrawal, and other limitations associated with reuse of

reclaimed wastewater from the estuary. The study predicts the need for this or other supplementary sources prior to the year 2000 based on the assumption that seven proposed upstream impoundments will be built. Findings of the final report should be closely coordinated with those of the U. S. Army Corps of Engineers report expected early in 1971. If the use of the upper estuary as a supplementary water supply is to be seriously considered as a viable alternative, then an early decision to this effect must be made. Concurrent with such a decision, planning procedures must be initiated to provide proper decisions as to plant sitings, water quality criteria, et cetera, which directly affect this potential use.

8. The need for reliable and current population projections is becoming increasingly important to resolution of wastewater disposal and water supply problems in the area. There is needed a mechanism by which readily usable projections are made available for use by all planning agencies in the area on an annually updated basis.

9. In view of the increasingly competitive demand for the limited land available for wastewater plant sites, and other restrictive factors, the acquisition of such sites is becoming a complex problem. Planning and operating agencies should plan early for the selection and reservation

of adequate sites. To assist in this action, recommended guidelines for selecting waste treatment plant sites, outlining factors other than the usual engineering constraints, are being developed for possible use by all agencies associated with this problem.

10. The conferees should take appropriate action to resolve each of the regional problems identified in these "Summary and Conclusions" and to delineate necessary guidelines and criteria.

The Short-Term Planning Committee would like to make one recommendation at this time as part of its interim report.

## B. Recommendation

In view of the fact that the work of the Short-Term Planning Committee and its Task Forces indicates, in several areas of consideration, a need for further study after the January 1, 1971, deadline, it is recommended that the conferees immediately provide concise guidelines and a specific organization for resumption of the study functions with precise directions as to the objectives to be met by this study group.

## C. Short-Term Planning Committee Status Report

The STPC held its organizational meeting on May 5, 1970, and has continued to hold monthly meetings since that time. Agencies officially represented on the STPC are: FWQA, Maryland Department of Health, Maryland Department of Water Resources, D. C. Health Services Administration, and the Virginia State Water Control Board. Ex-officio members of the STPC are the Regional Sanitary Advisory Board (RSAB) and the Metropolitan Washington Council of Governments (MWCOG).

The monthly meetings of the STPC are open meetings and are conducted informally with agreement on decisions reached by consensus. FWQA provides the secretarial service to the STPC which includes the preparation of meeting summaries, notifications of impending meetings, and the drafting of all reports.

The primary accomplishment of the STPC has been the organization and direction of five task forces as proposed by the conferees, and the assembly of this report.

The STPC reviewed the study organization and schedule approved by the conferees to determine its charge and the charges to the task forces. Task Force 2, "Land Development Runoff, Sediment," was absolved by the STPC in July with concurrence of the conferees, in deference to existing committees functioning under Recommendations 8 and 12. The membership of the remaining four task forces was approved with minor additions. The lead agency representative of each task force was invited to attend an STPC meeting at which time he was given general guidelines for approaching his charge, priorities for resolution, and in some instances a proposed task force organization for consideration. The chairman of each functioning task force was then invited to attend monthly meetings of the STPC where he reported on progress made and/or presented results obtained by his task force. The progress of each task force was thus reviewed and further direction offered by the STPC on a monthly basis. On occasion, various specialists were invited and participated in the discussions.

## D. Task Force Status Reports

The task forces submitted status reports which were accepted and reviewed by the STPC and have been summarized herein:

### 1. Task Force 1, "Technology, Fail-Safe, Sludge Disposal, Combined Sewers, Urban Drainage, Load Transfer, Multiple Disposal Points."

Task Force 1 held its organization meeting on October 23, 1970. It includes a membership of FWQA, Office of Water Resources Research (DOI), Office of Saline Water (DOI), and RSAB Wastewater Collection and Disposal Committee, and RSAB Solid Wastes Disposal Committee. The task force has been gathering and analyzing a "state of the art" compilation of criteria, guidelines, and bibliography applying to the various problem areas of its charge for inclusion in the final report. In order to determine the extent of the sludge disposal problem in the conference area a sludge disposal survey is being conducted. The results of these activities should be closely studied when available and utilized by agencies in the area as plans are made for the enlarging and upgrading of existing facilities, or the design of new facilities.

2. Task Force 3, "Space Limitations for Existing Facilities"

Task Force 3 includes a membership of FWQA, MWCOG, RSAB Wastewater Collection and Disposal Committee, and local operating agencies. Its final report is presented in its entirety below:

"In accord with Recommendation 4 of the Potomac Enforcement Conference, and as directed by the Short-Term Planning Committee, Task Force 3 held a meeting on October 15, 1970, at the office of the Washington Suburban Sanitary Commission for the purpose of completing its assignment.

"Previous to the meeting, a site evaluation form was mailed to each agency operating a wastewater treatment plant in the area which was listed in the April 1969, or November 1969, Potomac Enforcement Conference 'Proceedings.' These forms were to be completed and returned for discussion at the October 15 meeting.

"The response to the mailings and attendance at the meeting was most gratifying. The results of the survey are summarized on the table and 'Results' sheet attached. The survey revealed that there are two plants in the area with siting problems. The first is the District of Columbia Water Pollution Control Plant at Blue Plains, where some unusual construction techniques may be required in order that the present site be adequate for the planned expansion and upgrading, a situation of which the STPC and the conferees are aware.

"The second plant is the Arlington Water Pollution Control Plant operated by Arlington County. The present plant occupies 18 acres of the total of 21.5 acres owned. Upgrading proposed in the immediate future will require the acquisition of additional land. The County's consultant is currently studying the siting problem.

"Separately furnished for your files is a summary of the October 15 Task Force meeting and copies of the executed site survey forms. It is believed that the furnishing of the above information completes the current assignment of Task Force 3."

3. Task Force 4, "Reclaimed Wastewater Reuse"

The STPC determined that the charge to Task Force 4 could best be accomplished by overviewing the FWQA Chesapeake Technical Support Laboratory's "Water Resources-Water Quality Study of the Potomac Estuary," and to present a commentary report to the STPC at the end of the CTSL study.

Agencies represented on Task Force 4 are: FWQA, Maryland Department of Health, Virginia State Health Department, D. C. Health Services Administration, MWCOG, RSAB Water Supply Committee, U. S. Army Corps of Engineers and the U. S. Public Health Service.

The organizational meeting of Task Force 4 was held on September 25, 1970, at which time representatives from CTSL detailed the modeling activities and the progress of the study of the estuary.

On November 24 a meeting was held to discuss the preliminary results presented by the CTSL on November 12. The results of these discussions were:

a. The final results of the CTSL study should be closely coordinated with the COE study.

b. Additional model runs should be made to include the effects of the construction of more than the seven reservoirs currently proposed (Verona, Sixes Bridge, North Mountain, Bloomington, Sideling Hill, Little Cacapon, Town Creek).

c. A sensitivity analysis of the model results should be made by additional model runs using population projections both higher and lower than those used in the initial runs.

4. Task Force 5, "Land Use, Development, Siting"

A summary of the interim report of Task Force 5 follows:

"In accordance with the intent of Recommendation 4, the Short-Term Planning Committee gave Task Force 5 two assignments: first, to provide population projections for use of the FWQA Water Resources-Water Quality Study of the Potomac Estuary, and second, to develop a set of guidelines for the selection of future waste treatment plant sites.

"The Short-Term Planning Committee agreed that the Council of Governments Special Committee on Population and Employment Growth, which included staff representation from each of the members of Task Force 5, as well as policy level (elected) officials from a number of local jurisdictions, and which was evaluating many aspects of projected population and employment, was sufficiently broad for the purposes of providing the necessary projections for the FWQA study. As a result, population projections accepted by the Special Committee for planning purposes for 1980 and 2000 were distributed by the COG and FWQA staff to wastewater drainage basins in early September. The FWQA staff projected these estimates to the year 2020.

"Task Force 5 held its organizational meeting on October 21, 1970. It includes a membership of the Metropolitan Washington Council of Governments, National Capital Planning Commission, Maryland National Capital Park and Planning Commission, and the Northern Virginia Planning District Commission.

"For purposes of developing the treatment plant site selection guidelines, Task Force 5 was expanded to include several additional agencies: Arlington County Department of Public Works, D. C. Department of Sanitary Engineering, Fairfax County Planning Commission, Federal Water Quality Administration, Prince Georges County, and Washington Suburban Sanitary Commission.

"The expanded Task Force met on four occasions, resulting in a draft set of guidelines which were submitted to the Short-Term Planning Committee on November 24, 1970. The guidelines are being reviewed in accordance with the comments of the STPC, and will be included in the final report of the STPC."

E. Short-Term Planning Committee Summary Report

Upon receipt and evaluation of the Task Force interim reports, the STPC:

1. Adopted the 10 "Summary and Conclusions" as presented for inclusion in the Interim Report.
2. Adopted the one Recommendation to resume study in several areas after January 1, 1971. Some areas in need of further study, in general, are:
    a. More detailed analysis of the waste treatment processes available and their specific application to waste treatment problems in the conference area.
    b. More detailed analysis of the combined sewer and urban drainage problems in the conference area and the development of specific recommendations for their control.
    c. Coordination and evaluation of the CTSL and U. S. Army Corps of Engineers estuarine studies when completed.
    d. Use of the CTSL model to evaluate additional water quality management alternatives.

MR. STEIN: Any comments?

(No response)

This is a very good report. Thank you very much.

You know, there is going to be one day when a committee comes up with a recommendation that doesn't say that we have to have further study. But I guess --

MR. McKEE: Never happen.

MR. STEIN: Never happen.

Thank you very much.

## STATEMENT OF
## WILLIAM J. RILEY,
## OFFICE OF ENFORCEMENT AND STANDARDS COMPLIANCE,
## ENVIRONMENTAL PROTECTION AGENCY, WATER QUALITY OFFICE,
## CHARLOTTESVILLE, VIRGINIA

MR. RILEY: My name is William Riley, with the Office of Enforcement and Standards Compliance, Charlottesville Regional Office of the Water Quality Office, EPA.

Recommendation 10 of this conference called for the establishment of a committee composed of representatives of the Federal and State regulatory agencies to:

(a) conduct a joint survey of oil storage areas, terminals, and oil pollution from vessels, and

(b) recommend to the conferees actions required to minimize the possibility of pollution by oil and other petroleum products.

Upon its formation in July 1969, the Oil Survey Committee embarked on a three-phase program to:

(a) inventory oil storage and handling facilities,

(b) conduct representative field surveys of such facilities, and

(c) develop recommendations for a prevention program aimed at reducing both existing and potential discharges of oil to the aquatic environment.

The Committee subsequently inventoried approximately 300 of the major oil handling and using facilities in the conference area. These facilities store or handle over 180,000,000 gallons of oil and petroleum products. Site surveys were conducted at approximately 100 of these facilities. The site surveys represent 88% of the oil inventoried.

Numerous potential oil pollution problems were noted during the site surveys. Many of the facilities surveyed lacked: proper spill preventive measures, bulk storage area containment facilities, positive oil storage area drainage control, good housekeeping practices, and employee training and awareness. However, many of the problem areas identified have since been alleviated as a result of actions instituted by the facility operators at the request of the appropriate water pollution control agency.

In addition to completing the inventory and site visit phases of the Committee's program, a draft of the Committee's report has been completed and forwarded to the Committee members for review.

At the November 1969 Progress Meeting, the Committee Chairman reported that the Oil Survey Committee's report would be completed and presented to the conference by November 1970. The Committee now wishes to withhold presentation of its findings and recommendations until Federal oil spill prevention regulations are issued pursuant to Section 11 of the Federal Water Quality Improvement Act of 1970. This Act, enacted in April 1970, has a significant impact upon the Committee's charge in that the Act calls for the issuance of regulations establishing procedures, methods, and requirements for equipment to prevent discharges of oil from vessels and from on-shore facilities and off-shore facilities. These regulations have not yet been issued but are expected to be in the near future. Upon their issuance, the Committee will proceed with the completion of its final report.

MR. STEIN: Thank you, Mr. Riley.

Any comment or question?

(No response)

Mr. Riley, how many of these hundred facilities do you think have adequate devices such as you listed here -- spill prevention measures, bulk storage area containment facilities, drainage control, et cetera -- to prevent oil spills?

MR. RILEY: This would be purely an estimate on my part. I have not compiled this. I would say somewhere in the neighborhood of 20 percent of them might have what we consider to be adequate measures.

MR. STEIN: Well, I wonder if it wouldn't be worthwhile breaking that down by name so we can do it.

MR. RILEY: You want to do it by name?

MR. STEIN: Yes, I do. Let me tell you the reason why. We started operating this Federal law on oil spills from on-shore installations. We find the way this law is written we come up with a result that I don't think I anticipated. I don't know whether the Congress did or not. But we try to get the discharger to be responsible for the cleanup. If the discharger is not responsible, then the Government cleans up. We go back and collect the money for the cleanup from the discharger.

If you proceed against one of the major oil companies, in a way this gets to be a hardship as you probably can guess from reading the papers. I think with the Shell Oil on those wells that are just burning, they have agreed to go out and clean that up. However, we did have a case -- and let me be specific on this to show you what happens to the smaller company. A couple of weeks ago, we had a spill by a small oil company that was reclaiming crankcase oil. They didn't have the facilities or the organization for the cleanup. Bills started coming in for the cleanup, and we estimate maybe they are about $¼ million. We went against this firm and if I were to make a guess, I guess their assets certainly are not over $300,000, maybe as low as $100,000. So the next day what did the firm do? They filed a petition in bankruptcy. We are trying to work that out now and not drive them out of business.

What I am saying is that the remedies we have and the financial impact we have on these firms handling oil is so strong that one accident can just wipe them out. Again, I always feel if you have to clean up pollution by putting the company out of business, you really haven't done the job. That is not what we are here for, but we must operate under the law. The law has this tremendous impact on these companies. While not knowing the facts, I would bet almost none of these hundred firms have insurance to cover events of this magnitude.

Therefore, I think, given that experience, the oil people should really get to work on seeing that these preventive devices are in. It is not a question if something is going to happen, it is when. We are going to have an oil spill in the Potomac Basin and we are going to have to move. If you have it here, you know we are going to move under the glare of full publicity, probably going to have to spend a lot of money, and if we do that, my job is going to be to recover it. And looking at most of these firms I can tell you what the consequences are.

So can we get a list of these names and try to get after them one by one to see if they would agree to put in remedial facilities?

MR. RILEY: Well, we have this. We are including the site visit forms for each of the -- it turned out 103 facilities visited, as an appendix to our report. In other words, what you are asking for is the list in the report saying what the problem is, what is being done about it.

MR. STEIN: I think we have to fan these out to the States, too -- Maryland, Virginia, and if any are in the District of Columbia -- so that they can move with the companies to get these out. I will be glad to give you the facts on the cases that we have had. But I think all of us have to tell these companies now, given a spill and the operation of the Federal law, unless they have gotten these devices in, they may find themselves faced with a lawsuit that is just going to bankrupt them. They should know this in advance so we can get these measures put into effect.

MR. RILEY: Of course, the solution to this thing is the prevention aspects.

MR. STEIN: That is correct.

MR. RILEY: The committee has looked hard at this, and due to the impact of the Federal law, which calls for the issuance of the regulations of what preventive measures will be provided, the committee has elected to withhold --

MR. STEIN: We should get the names of these so the people who we believe don't have adequate measures can be gotten in touch with by the State. For example, in a lot of these places if they just had a dyke around the tank they would have saved millions of dollars, and they don't have it.

MR. RILEY: I can get this information.

MR. STEIN: I know they don't have this in the Potomac. But again I think we have to get this out. How long will it take to get a list of the people who are not in compliance?

MR. RILEY: A couple or two weeks.

MR. STEIN: Can you get them directly to the State agency and get a letter and give us a copy, too?

MR. RILEY: They have it.

MR. STEIN: All right.

Thank you.

Mr. Cook.

STATEMENT OF

R. KENNETH TINSLEY,

CHIEF, SURVEILLANCE BRANCH,

ENVIRONMENTAL PROTECTION AGENCY, WATER QUALITY OFFICE, MAR,

CHARLOTTESVILLE, VIRGINIA

MR. TINSLEY: Mr. Chairman, conferees, I am Kenneth Tinsley, with the Charlottesville Regional Office, Chief of the Surveillance Branch, representing the Stream Monitoring Subcommittee with respect to Recommendation 12.

If it is satisfactory with the Chairman, I will read portions of my report and summarize others.

MR. STEIN: The entire report will appear in the record as if read.

MR. TINSLEY: As outlined in the Stream Monitoring Subcommittee Progress Report of May 12, 1970, considerable effort was expended to determine data needs in the Potomac

Enforcement Conference area. From this information the inventory of stations was reviewed and altered to satisfy the needs outlined above. Joint agency meetings were held to effect full coordination on data reporting, analytical quality control procedures, central storage of data and a standard river mile index system. The Subcommittee then proceeded with the design of a fully integrated and coordinated stream monitoring program, in accordance with guidelines provided in their report of September 23, 1969.

## II. DATA REPORTING

All water quality data collected in the Enforcement Conference area will in the future be reported to FWQA, Middle Atlantic Region monthly. The data will be computerized and disseminated to all interested agencies. The frequency of distribution, stations and parameters of interest and the format of output will be determined by each individual agency's needs. Up to date inventories of water quality stations and data in the centralized system will be available to anyone upon request. Graphical plots and statistical listings of any of the data will also be available.

## III. ANALYTICAL QUALITY CONTROL PROCEDURES

In the past few years it has become more apparent that standardized analytical techniques must be employed in water pollution control work. At this point in time, the FWQA Chemical Methods Manual is being utilized by all of the agencies represented on the Subcommittee.

Analytical methods used to determine water quality of samples to be reported to central data storage will conform with methods outlined in FWPCA Methods for Chemical Analysis of Water and Wastes, except in cases where methods have not been standardized or where unusual environmental conditions exist. Exceptions to the standard analytical procedures will be documented.

## IV. RIVER MILE INDEX SYSTEM

Over the past several years, many procedures have been utilized for the development of river miles on the Potomac. In the interest of eliminating all confusion and establishing a mutually acceptable system of river miles the Subcommittee adopted a standard river mile index system. (Attachment A)

And I might add, Mr. Chairman, these mileages were determined in accordance with the Water Resource Council bulletin number 14.

MR. STEIN: Does this fit in with the Corps of Engineers notation?

MR. TINSLEY: The Corps of Engineers is represented on the Water Resource Council, and I assume this is the case, although I have not checked it myself.

## V. COORDINATED STREAM MONITORING PROGRAM

The ultimate water quality monitoring program will tie together State and interstate water pollution control agencies' monitoring programs into one surveillance network for the Potomac River Enforcement Conference area. In addition the program will provide for rapid access to all data and help indicate long-term trends in water quality which will determine 1) when and where corrective action should be taken 2) water quality improvements resulting from abatement action taken in the vicinity of the monitoring site, 3) verification of mathematical models. The program will assist in determining levels of investment needed to achieve incremental improvements in water quality, and will permit more rapid detection and a better characterization of various toxic materials in the basin.

## VI. RECOMMENDATIONS AND CONCLUSIONS

1. The attached River Mile Tabulation (Attachment A) is recommended to the conferees as the "official River Mile Tabulation" for the main stem of the Potomac.

As a part of this recommendation the Interstate Commission on the Potomac is encouraged to submit the same tabulation for approval by the INCOPOT Water Quality

Advisory Board. This should result in a river mileage system for the entire basin which would be acceptable by all interested agencies.

2. The Subcommittee recommends the following stream monitoring program as the minimum program to satisfy water quality data needs on the main stem of the Potomac in the Enforcement Conference Area:

A. Sampling Stations

| Location | River Mile |
|---|---|
| Chain Bridge | 114.65 |
| Key Bridge | 111.30 |
| Memorial Bridge | 109.80 |
| 14th Street Bridge | 108.75 |
| Hains Point | 107.05 |
| Bellevue | 104.65 |
| Woodrow Wilson Bridge | 102.55 |
| Broad Creek | 99.45 |
| Piscataway Creek | 96.30 |
| Dogue Creek | 92.35 |
| Gunston Cove | 90.35 |
| Hallowing Point | 87.75 |

Two automatic monitors used in conjunction with the routine sampling program would provide a continuous update of the water quality conditions in the Enforcement

Area. It is recommended that continuous monitoring devices be installed and maintained to supplement the routine program.

### B. Sampling Depth and Location

The samples should be taken in mid-channel at two depths -- one foot below the surface and five feet from the bottom. The samples should be analyzed separately. This top and bottom analysis will allow evaluation of the effects of algal growths on many water quality parameters. The variance in water quality across the transects has been established from previous sampling and is well documented. Future intensive work in this area will be required periodically.

### C. Analyses to be Performed

There should be separate chemical and biological analyses of each sample taken at both depths with no compositing. The following analyses should be made:

| Field Analyses | Frequency |
|---|---|
| 1. pH | Weekly |
| 2. Temperature | " |
| 3. Dissolved Oxygen | " |
| 4. Salinity (not needed if chloride determination is made) | " |
| 5. Secchi Disc | " |

| Laboratory Analyses | Frequency |
|---|---|
| 1. Total Phosphorus | Weekly |
| 2. Inorganic Phosphorus | " |
| 3. Nitrite and Nitrate Nitrogen | " |
| 4. Ammonia Nitrogen | " |
| 5. Organic Nitrogen | " |
| 6. Chlorophyll A | " |
| 7. BOD (TOC can also be used) | " |
| 8. Chlorides (not required if salinity is measured in the field) | " |
| 9. Fecal Coliforms | " |

### Special Analyses

Pesticide, radio chemical and trace metal analyses should be run at the Memorial Bridge and the Woodrow Wilson Bridge quarterly to document long-term trends and establish base line data.

### D. General Recommendations

The sampling program does not include embayments or shorelines. This type of sampling is better accomplished on an intensified basis because conditions in the embayments can change rapidly.

Monitoring plans for the tributaries to the Potomac within the conference area are currently being developed by the Subcommittee.

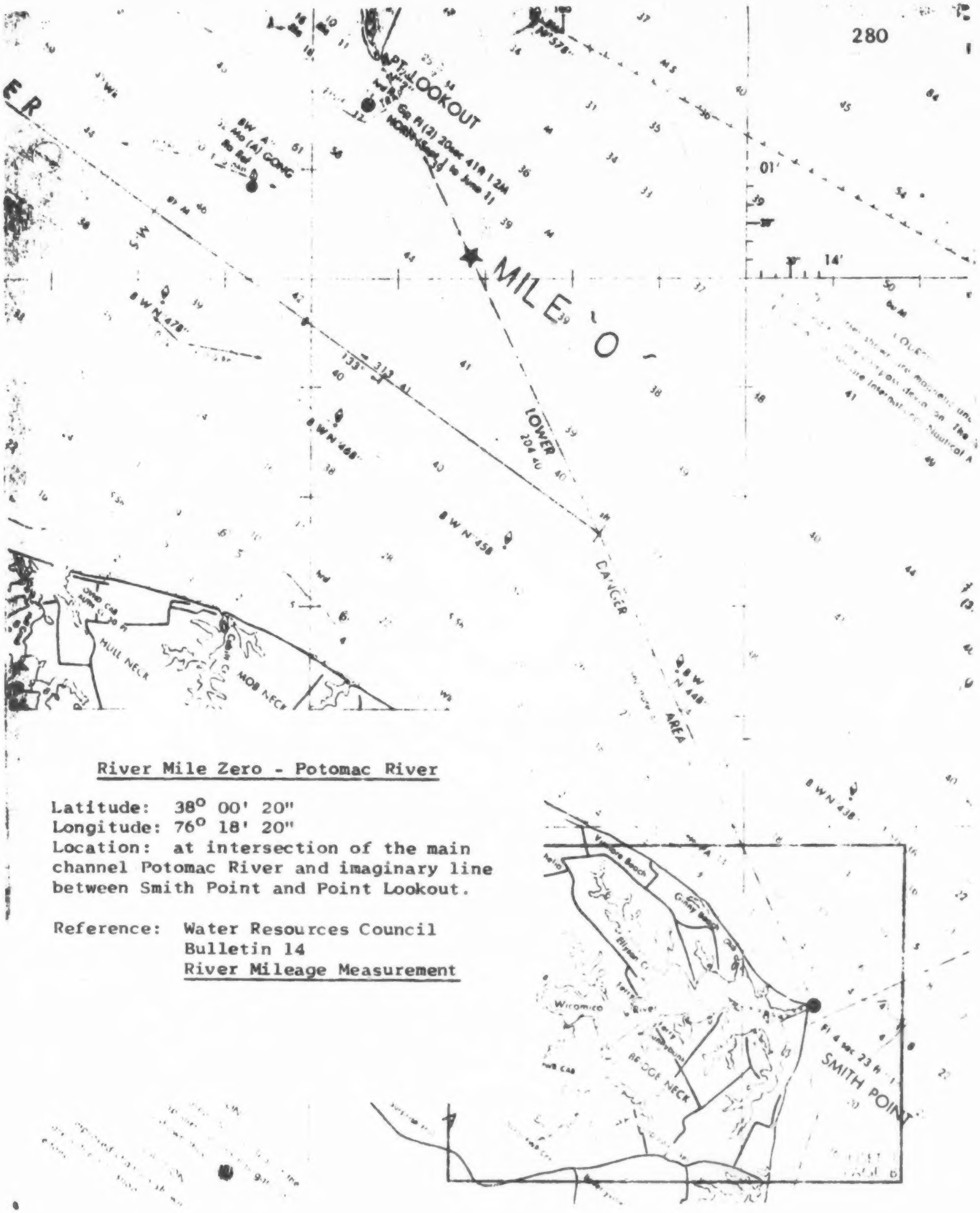
3. Although the Enforcement Conference has limited its jurisdiction to the hydrologic portion of the Potomac Basin between Little Falls and Hallowing Point, the water quality in this area greatly affects the estuary downstream and is affected by established water uses of present and future pollutional discharges taking place in the nontidal water upstream. The Subcommittee recommends that present sampling locations and water quality parameters be examined and the recommended monitoring program for the Enforcement area be expanded to include the entire Potomac Basin. The development of such a coordinated, integrated stream monitoring program could be accomplished either by this Subcommittee or by a similar group from within the Interstate Commission on the Potomac River Basin.

4. It is recommended that this Subcommittee remain active until procedures for implementing the proposed monitoring plans are established. Subsequently, the plan should be periodically reviewed by representatives of each of the interested parties to assume the operation of a dynamic stream monitoring program.

## STREAM MONITORING SUBCOMMITTEE

| | Representing |
|---|---|
| R. Kenneth Tinsley, Chairman | Water Quality Office, EPA |
| John Longwell | Maryland Department of Water Resources |
| A. W. Hadder | Virginia Water Control Board |
| Robert Perry | District of Columbia Department of Sanitary Engineering |
| John Brink | District of Columbia Department of Human Resources |

(Attachments follow:)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Ellyson Cr
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Fl 4 sec 23 ft
SMITH POINT
01'
14'

## River Mile Zero - Potomac River

Latitude: 38° 00' 20"
Longitude: 76° 18' 20"
Location: at intersection of the main channel Potomac River and imaginary line between Smith Point and Point Lookout.

Reference: Water Resources Council
Bulletin 14
River Mileage Measurement

Potomac River
Main Stem

## POTOMAC RIVER BASIN - (Index 0214001)

| Miles on Base River | Stream | Level | Index |
|---|---|---|---|
| 6.30 | Coan River | 2 | 000270 |
| 10.30 | St. Mary River | 2 | 000400 |
| 26.50 | Nomini Bay | 2 | 000890 |
| 33.40 | Wicomico River | 2 | 001100 |
| 36.30 | Mattox Creek | 2 | 001270 |
| 44.90 | Machadoc Creek | 2 | 001390 |
| 51.80 | Port Tobacco River | 2 | 001520 |
| 54.40 | Nanjemoy Creek | 2 | 001560 |
| 63.30 | Potomac Creek | 2 | 001810 |
| 66.80 | Aquia Creek | 2 | 001850 |
| 76.50 | Quantico Creek | 2 | 002110 |
| 80.20 | Mattawoman Creek | 2 | 002180 |
| 80.70 | Neabsco Creek | 2 | 002150 |
| 81.60 | Occoquan Bay | 2 | 002190 |
| 87.30 | Pomonkey Creek | 2 | 002260 |
| 89.60 | Gunston Cove | 2 | 002290 |
| 91.80 | Dogue Creek | 2 | 002330 |
| 94.10 | Little Hunting Creek | 2 | 002410 |
| 95.50 | Piscataway Creek | 2 | 002500 |
| 98.70 | Broad Creek | 2 | 002540 |

## POTOMAC RIVER BASIN

| Miles on Base River | Stream | Level | Index |
|---|---|---|---|
| 101.50 | Hunting Creek | 2 | 002570 |
| 102.90 | Oxon Creek | 2 | 002600 |
| 105.20 | Fourmile Run | 2 | 002630 |
| 106.10 | Anacostia River | 2 | 002640 |
| 110.20 | Rock Creek | 2 | 002700 |
| 114.10 | Pimmit Run | 2 | 002810 |
| 114.60 | Little Falls | 2 | 002820 |
| 117.30 | Cabin John Creek | 2 | 002880 |
| 118.50 | Rock Run | 2 | 002900 |
| 120.30 | Scott Run | 2 | 002970 |
| 122.40 | Difficult Run | 2 | 003010 |
| 132.20 | Seneca Creek | 2 | 003260 |
| 133.80 | Sugarland Run | 2 | 003290 |
| 137.80 | Beaverdam Run | 2 | 003350 |
| 140.40 | Goose Creek | 2 | 003370 |
| 151.60 | Little Monocacy River | 2 | 003620 |
| 151.80 | Monocacy River | 2 | 003640 |
| 158.30 | Catoctin Creek | 2 | 003810 |
| 160.70 | Catoctin Creek | 2 | 003900 |
| 169.70 | Shenandoah River | 2 | 004230 |

Potomac River
Main Stem
(Continued)

## POTOMAC RIVER BASIN

| Miles on Base River | Stream | Level | Index |
|---|---|---|---|
| 178.50 | Antietam Creek | 2 | 004600 |
| 200.30 | Opequon Creek | 2 | 005090 |
| 208.00 | Conococheague | 2 | 005420 |
| 215.10 | L. Toms Run | 2 | 005540 |
| 220.30 | Harland Run | 2 | 005630 |
| 224.20 | Back Creek | 2 | 005710 |
| 229.20 | Licking Creek | 2 | 005900 |
| 231.50 | Sleepy Creek | 2 | 005990 |
| 235.80 | Tonoloway Creek | 2 | 006160 |
| 236.70 | Warm Spring Run | 2 | 006190 |
| 237.60 | L. Tonoloway Creek | 2 | 006240 |
| 242.70 | Sir John's Run | 2 | 006330 |
| 246.20 | Cacapon River | 2 | 006350 |
| 249.50 | Sideling Hill Creek | 2 | 006400 |
| 253.70 | Fifteenmile Creek | 2 | 006420 |
| 275.70 | Purslane Run | 2 | 007440 |
| 278.00 | Little Cacapon River | 2 | 007450 |
| 280.80 | Town Creek | 2 | 007460 |
| *283.40 | South Branch | 2 | 007590 |

* The North Branch of the Potomac River is assumed to be the main stem and is indexed as such.

## POTOMAC RIVER BASIN

| Miles on Base River | Stream | Level | Index |
|---|---|---|---|
| 292.50 | Patterson Creek | 2 | 008710 |
| 300.90 | Evitts Creek | 2 | 008740 |
| 305.10 | Wills Creek | 2 | 008760 |
| 329.00 | New Creek | 2 | 008990 |
| 334.80 | Georges Creek | 2 | 009040 |
| 336.90 | Savage River | 2 | 009080 |
| 354.70 | Abrams Creek | 2 | 009210 |
| 361.70 | Stony River | 2 | 009290 |

MR. STEIN: Thank you.

Any comment or questions?

(No response)

Well, first I would recommend that before the conferees adopt a numbering system, we really ascertain whether the Corps of Engineers has the same one. I would hate to embark on a numbering system which was different from another major water resource agency here, because I don't think we would be doing anyone a service. We should check that.

MR. TINSLEY: Yes, sir.

MR. STEIN: I think your work looks very good.

Let me make another brief point. I see your sampling points in the enforcement area, but they just cover the enforcement area. They are precisely the monitoring sampling points which have never given us the information we need. We need sampling points outside the waste treatment plants to see what kind of a job they are doing 24 hours a day. Just putting them up here, showing us the water is bad in the river, and then we have to trace this to a particular plant, we don't get this. I wonder if you could reconsider this and give us the kind of sampling which will give us water quality and, at the same time, if there is a failure in achieving that water quality will pinpoint the plant or the source that was at fault.

MR. TINSLEY: As I attempted to point out, sir, the monitoring program as presented is the minimum. Some of the subcommittee members have indicated at this point in time that they plan to supplement this considerably. The original reports of this subcommittee did document a number of stations. I don't remember the specific number, somewhere in the vicinity of 75 to 100 stations that are in existence; but we can attempt to specifically identify the points that you mentioned.

MR. STEIN: I know what you are saying. You are saying what the monitoring people have done for years, and that is why we have said in Enforcement that we are not going to put another dime in here unless you give us material we need.

Now as far as I am concerned, the minimum sampling stations are the stations outside the waste treatment plants to see if they are doing their job. If you don't have any other, that is the minimum. And we have some pretty good requirements on these plants here. So let's find out if they are working.

But this kind of thing as a minimum is giving us criteria in the river, an additional monitoring in the river and reports in a river that has been studied as much as any river in the country, and we are going to get the same kind of general stuff that we already know through the years. What we have to know here is on a day to day basis 24 hours a day, 365 days a year, how the various treatment plants are doing their work. That is the kind of monitoring that the Enforcement people are looking for.

MR. TINSLEY: Yes, sir, I can appreciate that.

MR. STEIN: All right. By the way, again this is an ongoing discussion. Now one of the things you know the Administration has recommended is effluent requirements. Again, let me say you might begin to think of this. But I think the only way we are going to clean up one of these major areas is have a continuous monitoring of the effluents by all these sources and, I might add, paid for not by the States or the Federal Government but by the sources themselves. I believe that they are going to have to pay for that the same way as using gas or water or electric. You pay for the monitoring device on what you use and how much you use. Then you have the little black box there that is locked that only the official agency can get into. An industry or city should have one of these black boxes where only the State people or the official agency can get in.

Or arrangements should be made for it to be done with an independent laboratory, certified by the State, and they report directly to the State as well as to the industry or the city. But in all instances, I think the responsibility might be on the industry or the city to provide this kind of monitoring service for us. Maybe we could funnel that into the program and alleviate the cost of getting the kind of data we need.

Let's stand in recess for 10 minutes.

(Whereupon, a recess was taken.)

MR. STEIN: I believe there were some questions.

MR. HOPE: Yes, if I may, Mr. Chairman, just before we recessed you raised an academic question in my mind, what I felt was somewhat over-preoccupation with the effluents from the several sewage treatment plants in the area. So far as I know, we are not operating on an effluent standard basis. The regulatory requirements are all couched in terms of stream quality; and in defense of one of your staff members, if I may, Mr. Chairman, I would say that this seems to me to be the area that should be emphasized as opposed to the continuous day-by-day monitoring of the effluent from the treatment plant.

MR. STEIN: Well, we can talk about that. I think we have two programs, of course. Our stream standards program is based on stream standards, but in the Enforcement Conferences, and in this one, we have always been couched in terms of effluent requirements. Originally we asked for secondary treatment, 80 percent removal of BOD, chlorination during the summer months, and so forth. And the requirements of the plants have been on effluent requirements. I, myself, don't see any real difference on that.

As a matter of fact, the Administration has come up with the proposal and the President has sent this forth to Congress that we must have effluent requirements as well as stream requirements. We have always asked for those effluent requirements in the Enforcement cases. And I think we have to have both.

But the way I look at the situation, we assume too frequently that because we have a treatment plant that things are going to be fine. The treatment plants, it seems to me, don't operate the way an electric utility plant or water plant or gas plant operates. They don't operate every day in the year round the clock. I might say if I were to look at any place, particularly in the east which were the big sources of municipal and industrial pollution, the first place I would look at are the outfall lines from the municipal and industrial waste treatment plants. That is where I think the waste load is coming from, and when the plant doesn't work that's why we have this problem. We have to zero in and see that they are working all the time. This does not mean that we shouldn't have stream monitoring as well.

MR. HOPE: You raise a further question in my mind then, Mr. Chairman. The stream quality standards, of course, relate in large measure to stream flow. I could visualize under the terms of those efficiency requirements some varied levels of degree of operation of your sewage treatment plants in order to achieve a given quality of water in the stream.

This relates in part to one of the points that we discussed at some length yesterday -- that during periods of normal or high flow in the Potomac River is it going to be necessary, for example, for the treatment plant at Blue Plains to operate at these extremely high removal efficiencies for phosphorus and notrogen.

MR. STEIN: That's why we set pound loadings --

MR. HOPE: Those are under periods of critical low flow, Mr. Chairman, and that was one point you made with Mr. Aalto when he made his presentation.

MR. STEIN: Mr. Hope, I agree with you.

MR. HOPE: Thank you.

MR. STEIN: I think this is precisely the kind of question we have to consider. Maybe we are lucky here, because when you deal with this biological treatment, at least something we are going to deal with a little bit in the future, the plants tend to work better in warm weather than they do in cold weather. That is when we have the critical flows. So, we are lucky.

On this I think your point is dramatically shown. But in areas like Fargo, North Dakota, or moorhead, Minnesota, where they have the trickling filter, for example, and it doesn't work very well in the wintertime but it works well in the summertime -- evidently the bugs go into hibernation or something when it gets below zero up there -- you have an ice cover on the Red River in the north, and with the plant not working, you get an oxygen deficiency and wipe out everything.

Now I agree with you, this is the kind of thing that we are going to have to do when we get into treatment facilities to determine whether we have to keep operating at these high levels constantly.

I don't like to push this analogy concept too far, but I think we must adopt the idea that an electric company doesn't necessarily have to operate on peak load at 4:00 a.m. in the morning or on weekends and certain other off times when the factories are closed. I think if you deal with water quality management, you may have the same kind of concept in waste treatment.

One of the difficulties that I find -- and maybe, Mr. Hope and I grew up in the same school -- but with the kind of analyses you tend to get from a projection or mathematical model, they come up with an immutable figure that you have got to live with, whatever the conditions in the river are all year round. I think we were both asking these questions. The reason I asked these questions about these assumptions is whether we should make a critical assumption. I think it was abundantly clear, though, those conditions are not going to be here all the time. What he did was assume the worst conditions, as I take it. Although we couldn't pin him quite down on that. But somewhere in that area he figured these loadings on the mathematical model for the absolutely worst conditions.

Again, translating that into the terms that I like to deal with at least, assuming the correctness of the assumption, we have to have a physical plant that is able to do that. We don't necessarily have to operate at that level at full capacity at all times.

Are there any other comments or questions?

MR. JACKSON: Mr. Chairman, might I ask wherein any difference lies in the river mile stations as assigned in this report to those already in existence and used on the Potomac River Basin by the Interstate Commission.

MR. STEIN: Would you care to answer that?

MR. TINSLEY: Over the past several years, some six or seven different systems of river mile measurement have come into existence on the Potomac. The system that we have here differs somewhat from the Interstate Commission mileages, but by and large it is by an incremental figure. We could take a distance of -- I believe it is somewhere in the vicinity of 10.8 miles, and modify each number as you progress upstream by that distance and they would be compiled.

MR. JACKSON: Was there any overriding need for that differentiation in the eyes of the committee? I assume there was.

MR. TINSLEY: I'm sorry, I can't hear you.

MR. JACKSON: Was there any overriding need to set that differential as part of your report? Was the former system not working or not quite adequate, or what is the need for the difference?

MR. TINSLEY: From the standpoint of the Stream Monitoring Subcommittee considerable confusion has existed over the past several years. For example, when the boundaries of the Enforcement Conference were first delineated there was some confusion as to distances since mileages were used, and it was the feeling of the subcommittee that in the future we can eliminate this confusion simply by standardizing, and this is what we are encouraging.

MR. JACKSON: You are recommending then that the figures you are presenting in your report be the basis for that standardization, is that correct?

MR. TINSLEY: That is correct.

MR. STEIN: I suggest we all agree -- I would hate to agree on figures that the Corps of Engineers didn't go with because we compound, I think, the problem. At least it is my feeling, I have no brief for one set of figures over the other, but I think we have to get agreement.

MR. JACKSON: Well, I think that's right. The only difference is, of course, all of your records are based on existing systems, and correlation between future readings or data will be somewhat difficult.

MR. STEIN: That is the question, whether it is worth while making a change.

Someone asked me a question during the intermission. I couldn't answer it. Let's try it. On page 3 of your report you deal with Piscataway Creek, 96.3 river miles. Then on your proposal you go back to Piscataway

Creek and you go 95.5. How come we have the two differences?

MR. TINSLEY: I would be less than truthful if I did not indicate that the same question was asked of me, and I have no answer other than to indicate based on the report as presented it is fact. However, I do plan to go back and check this out to determine if a discrepancy does in fact exist. If so, it will be made known to the conferees.

MR. STEIN: Well, again, sir, the reason I am doing this is I think the conferees would need this for a consideration, if you can give it to us. Let me repharse Mr. Jackson's question. He says we have a lot of data and information based on an existing system. If we are going to the trouble to change all that and come up with a new system, we are going to have to adjust all our existing records. Now the question he asks is what is the compelling reason to do that, when in fact it gives us a tremendous clerical job of changing all the other figures and translating them?

MR. TINSLEY: In terms of the compelling reason, the only thing that comes to mind is standardization. But I might point out that by utilizing the computerized system that we have, we will be able to accommodate the old mileages in addition to the new mileages, such that Mr.

Jackson can ask for retrieval of his data using the mileages that he has been using in the past, and we can make this type retrieval, or any other agency can use their system, ask for the data and get the same information. This is called the secondary station descriptions that the storage system does utilize. So you can address a station using as many as six different -- I think of them in terms of street addresses, and get to the same point in the computer. So I don't think it would present any problem.

MR. STEIN: All right, thank you very much.

Are there any other questions?

(No response)

If not, Mr. Cook.

## STATEMENT OF
## GROVER W. COOK (RESUMED),
## ACTING DIRECTOR, OFFICE OF ENFORCEMENT AND STANDARDS COMPLIANCE,
## ENVIRONMENTAL PROTECTION AGENCY, WATER QUALITY OFFICE,
## CHARLOTTESVILLE, VIRGINIA

MR. COOK: On the basis of today's reports and reports submitted to the May Conference, it is recommended that:

1. The entire Occoquan drainage basin be made a part of the Enforcement Conference area and that waste

Grover W. Cook

treatment requirements developed for the existing conference area be applied to the Occoquan Basin;

2. The Potomac Electric Power Company be commended for carrying out the study that was recommended and that the current program by Pepco for elimination of thermal pollution be accepted;

3. The problems associated with the construction of necessary interceptor sewer links (Project C) in the vicinity of the proposed Three Sisters Bridge be resolved. Continued delay in this area is deferring progress on the Rockville interceptor sewer and the Cabin John relief sewer, both projects supported by Federal construction grants. Delay is causing raw sewage overflows to the Potomac River. It is further recommended that the conferees review plans for elimination of pollution from combined sewers and sewer overflows and establish a timetable for control of pollution from these sources in accordance with Recommendation No. 5 of the original conference.

4. Recommendations 1-5 of the subcommittee on surveillance of waste treatment plant operations be approved as official recommendations of this conference;

5. Recommendation No. 6 that states "this subcommittee be dissolved" be accepted. I am changing this

Grover W. Cook

from the printing you have before you because on the basis of the conversation just before the recess, if seems to me and to several of us that I talked to that it might be more appropriate for this subcommittee to be dissolved and that the matter of operations of sewage treatment plants, the monitoring thereof, be combined with the original charge of the subcommittee that Mr. Tinsley reported on, monitoring of receiving waters. I think this might be an appropriate way to go on this one.

6. The Preliminary Study of Sediment Sources in the Potomac River Basin, May 1970, be accepted and the recommendations included therein be adopted by the conferees;

7. The report of the Stream Monitoring Subcommittee be accepted and the recommended stream monitoring and data reporting system be adopted as official recommendations of the Enforcement Conference.

I realize this is not a very strong recommendation in light of the request you made of Mr. Tinsley to verify the river mileage system.

8. The report by the CTSL be tentatively approved and that a final report be submitted to the conferees at the next progress meeting;

9. The recommendation of the Interim Report of

the Short-Term Planning Committee to resume study functions after the January 1, 1971, deadline be approved; and that the conferees provide concise guidelines and a specific organization to meet the objectives.

In regard to this last recommendation, the WQO respectfully requests that should the conferees approve this recommendation, WQO staff not be assigned to the role of secretariat or to active membership on elements of the study organization. This is essential to maintaining the integrity of WQO staff responsibilities in reviewing metropolitan, regional, and basin plans in compliance with the newly promulgated rules for award of construction grants for waste treatment facilities. WQO will continue to make available any appropriate staff specialists as consultants to any elements of the study organization the conferees establish. We feel that WQO staff participation must be restricted to that of consultation in an advisory role in the future.

MR. STEIN: Grover, just for clarification refresh my mind, what is the current program by Pepco for elimination of thermal pollution?

MR. COOK: Very briefly, their report showed essentially no problem at their Alexandria plant or their Buzzards Point plant. There may be occasional periods of thermal blocking in the Anacostia during very, very low flow periods in hot weather. They admit a severe problem with their Benning Road plant. They are systematically tearing down some of their old generators and installing new ones that have complete recycling of their water and will have their problem eliminated by about 1975.

MR. STEIN: What kind of heat rise are they having in the river?

MR. COOK: They have had some dandies at Benning Road; got up to 115 degrees.

MR. STEIN: Well, that's pretty high. What kind of heat are they putting in at the other locations?

MR. COOK: I can't tell you exactly.

MR. STEIN: Again, Mr. Cook, I think with the problems we are having on thermal discharges -- the Great Lakes, Biscayne Bay, which is an estuary, too -- it may be wise for us to look at that rather carefully again and have the States get in touch with the fish and game people and their parks people, and the District too, who are the most sensitive people in this area, to be sure we have a consensus before we go on that.

Now again, before we are going to begin to settle this kind of thing, that the time has come when we are past dealing with thermal blockages of streams but looking for much more subtle damages by putting out heated water. So this may be another area in which we are being overtaken by events. Unless we have some very precise indications in B.t.u.'s of the heated water coming out, B.t.u.'s I think we have to be careful of what we are going to approve. Then, if you are talking in terms of water going up to -- what did you say it went to, a hundred what?

MR. COOK: 115 degrees.

MR. STEIN: -- and giving them to 1975 to alleviate that, I think we are going to have a real careful look at that.

MR. COOK: I might suggest, Mr. Chairman, that we borrow Arnold Speiser to make a more careful analysis of this business, because he had some reservations about this recommendation. He is more knowledgeable about it than I am. He is not with the Health Department anymore, but he is very much interested. I think he could help us out on this.

MR. STEIN: Well, if we can, we will get Arnold to work with you and me, and we will have a hefty report.

Are there any other comments or questions?

MR. HADDER: Mr. Chairman, I have a question regarding Recommendation No. 1. I would like to know the basis upon which this recommendation was made to the conference.

MR. COOK: I think I am correct in saying that there were several -- three or four private citizens that expressed a desire for a part or perhaps all of Prince William County to be included in the conference area.

MR. STEIN: May I comment -- go ahead.

MR. HADDER: I would like to ask if there is any data to show that we have the same problem affecting the estuary in this area as we do in the metropolitan area upstream, to indicate that it should be included in the conference.

MR. COOK: I don't know of any such data, Mr. Hadder.

MR. HADDER: Mr. Chairman, we are going to strenuously object to the inclusion of this area in the conference. I can't believe you are serious in considering this, in view of the complexity of the problems we have already got to face, and to add this to it I think is more than we can bear. In addition to that, we feel like on a State level we have taken adequate steps and are very close to a solution of the problems. And again, I want to state we do object to the inclusion of this area in the conference.

MR. STEIN: Maybe I should have said something before. This is one thing we have to talk to as a matter of law. I don't think the conferees sitting the way we are at a conference can either expand or contract the conference area. This is not within our jurisdiction. The only way the conference area can be set is if the Secretary -- now the EPA Administrator -- calls it for that area on his own initiative on request of a State. To date, we have had no request from any of the jurisdictions here to expand it. I take it we are not going to get a request like that from Virginia in the near future. In the absence of a request from either Virginia, Maryland, or the District of Columbia, the only way we can expand it is if a recommendation by some staff members is made -- a specific written request to the Secretary that he has to approve -- rather, the EPA Administrator will do this himself. As far as I know, there are no papers directing him or asking him to do that.

If this is a recommendation of the conferees of this conference, I would ask that we do several things. If you really think the conference should be extended, the conferees can't do this themselves. Either Maryland, Virginia or the District of Columbia will have to write, in their official capacity, a letter to the Administrator of EPA requesting him to do this. If any members of the staff of EPA believe that this should be extended, they should send up a memo through channels making their recommendation. I will be glad to give it my recommendation and send it forward to the Administrator. That is the only way we can do it.

MR. COOK: Mr. Chairman, I would like to explain something. The former Assistant Secretary notified these private citizens groups that I mentioned informing them that this business of the expansion of the conference area to include part of Prince William County would be brought up in the next conference. I think even though we are not in the Department of Interior anymore, we were honorbound to bring it up. I think we have fulfilled that pledge.

MR. STEIN: I think you have brought it up.

Here is one of the problems that I have. Being a bureaucrat of over 30 years' service, I always find myself bound some way by the restrictions of Federal, State and local law. I just can't operate outside it; I don't know how, and that is our function. The law is very, very clear on how areas of conferences are established. The law certainly did not give that authority to the conferees. If they had it just imagine what could happen. All they would have to do is start us on the Mississippi River somewhere and we can go up and down the river on our own initiative and cover the country. We would be on the Mississippi, Missouri -- you just can't do that.

MR. COOK: I understand. The route then is for these people to go through the EPA Administrator.

MR. STEIN: Right.

MR. HADDER: Mr. Chairman, just one more comment for the record. I do want to indicate we do not object to expanding the conference area downstream on the main branch of the Potomac if the conferees feel that this is necessary. But not within the Occoquan watershed.

MR. STEIN: I understand your position on the Occoquan watershed. I think the Occoquan watershed -- well, I don't want to make any judgments on this because this gets complicated, and I think it is a little beyond the province of the conferees to consider that.

If anyone wants the conference expanded or changed from its present boundaries, there are two ways again of doing it. The EPA Administrator could do it. You should petition him to have it done, or get one of the States or the District to request that this be done. If this is the case we put it in motion. We can't be self-starters on that from the conferees' point of view; we would be exceeding our authority.

Are there any other comments or questions?

(No response)

If not, thank you very much, Mr. Cook.

Does anyone else who has been here want to say something, because I think we have had all the presentations and we probably will recess for lunch, and I am going to ask the conferees whether they want to go into executive session. I think an executive session is probably called for. But that is up to you people. We have some real tough questions to resolve and it might be more amenable for resolution in executive session. Is that agreeable?

When do you want to get back? It is 12:00 o'clock now.

MR. JACKSON: Well, Mr. Chairman, I might suggest that if we are to go into executive session we can adjourn and come back at 2:00 o'clock.

MR. STEIN: Surely. We will have an announcement after the executive session.

(Off the record)

MR. STEIN: We will recess, reconvene in executive session at a quarter to 2:00, then we will be back here.

(Whereupon, at 12:00 noon, the conference recessed, to reconvene in executive session at 1:45 p.m.)

## EXUCTIVE SESSION

### Conclusions and Recommendations

### AFTERNOON SESSION

(1:45 p.m. portion off-the-record) (4:20 p.m.)

MR. STEIN: We stand reconvened.

The conferees representing Maryland, Virginia, the District of Columbia, the Interstate Commission on the Potomac, and the Federal Government represented by the Environmental Protection Agency have come to unanimous conclusions and recommendations.

The conclusions are:

1. The immediate first step which must be taken to clean up the Potomac River in the Washington Metropolitan Area is awarding a contract by the District of Columbia to improve the Blue Plains Plant by constructing primary treatment and sludge processing facilities. In order to accomplish this, the District must receive a full appropriate financial contribution from all parties concerned. Therefore, the Federal Government, the District of Columbia, Maryland, Virginia, Fairfax County Virginia, and Washington Suburban Sanitary Commission, Maryland, are urged to seek every available means of providing the necessary financial contribution to assist the District in the construction of these facilities. Appropriate financial commitments for the first contract have been received from all jurisdictions

## Conclusions and Recommendations

except Fairfax County, Virginia

2. In order to upgrade and expand the Blue Plains Water Pollution Control Plant and to meet the Secretary of the Interior's challenge the District of Columbia must have the utmost cooperation from Congress, the Water Quality Office of the Environmental Protection Agency, Department of the Interior, and the local jurisdictions. The elements of that cooperation are contained in the following recommendations that:

(1) Financing be arranged for the entire project at the earliest possible time. This must include:

(a) Approval of a Federal sewage treatment construction grant for the entire project. This will require a grant of $197.6 million at the current estimated cost of $359.3 million. Both these figures include the recently approved project for primary treatment facilities and should be adjusted accordingly.

(b) Congressional appropriation of the District of Columbia and Potomac Interceptor share of the project ($80.1 million) together with the authority to borrow these amounts from the Federal treasury. This appropriation should be accompanied by authority to increase the sewer service rates fourfold in order to provide the District's share of amortization and operating costs at the improved facilities.

(c) Obligation of funds by suburban jurisdictions to cover their share of costs of the total project.

(2) The Federal Government expedite the approval and grant a permit to construct a dock facility and the necessary dredging.

It is essential that this work be completed and the concrete mixing plant be constructed while excavation is proceeding on the site so that the construction of the concrete tanks can begin immediately on the completion of excavation. Some idea of the size of this undertaking can be obtained by realizing that to meet the schedule we are proposing, an average of 1500 cubic yards of concrete must be poured each day for two years. The on-site concrete plant will eliminate traffic from over 200 ready mix trucks per day or about one every five minutes.

. (3) The Department of the Interior provide the D. C. Department of Sanitary Engineering suitable locations adjacent to the site for a (a) contractor's staging area and (b) construction employee parking.

(4) The Water Quality Office assign a senior employee

as a resident grant administrator at the project to make such inspections as are necessary to the Federal interest and to expedite Federal grant payments. It should be recognized that at the peak of construction there will be a large number of contracts proceeding simultaneously and that each contractor will expect monthly payment as his work progresses. During 1973 when construction activity is at its peak contractor payments are expected to average about $10 million per month which will require grant payments of $5.5 million per month.

(5) The Water Quality Office modify the usual construction grant processing procedures in order to expedite processing. For example:

(a) The construction schedule requires that grant awards (including the 10 percent increase in grant for compliance with regional plan) be made in time to meet contractual obligations required by the construction schedule. This will require the approval of grants without awaiting the concurrence by the Council of Governments and the Department of Housing and Urban Development because of the time requirements to obtain such concurrence. The inclusion of the District of Columbia's plan for sewage treatment plant improvements in the water and sewer plan and program reported by the Council of Governments and submitted to the Department of Housing and Urban Development should be adequate to demonstrate the concurrence of these agencies. A preferable alternate would be for WQO to consider this a single project with a single grant offer for the entire amount. A blanket approval could be obtained for the entire project thus expediting the consideration of the individual contracts.

(b) It will be necessary for the WQO to approve the overall project prior to the time of the submission of final plans and specifications for the various elements. It must be recognized that mass construction procedures will require that planning proceed concurrently with construction rather than be completed, reviewed and approved prior to the start of construction. This will mean, for example, that the District must receive approval and Federal grant payments for excavation prior to the time that plans and specifications are available for the treatment units.

## Conclusions and Recommendations

There is appended to this a chart indicating the estimated cost to expand and upgrade the plant to 309 MGD and estimated fund authorization by fiscal year necessary to meet proposed construction schedule based on the 55 percent United States grant, with State and local shares equal to 45 percent of the total cost.

In addition to this there is a bar chart indicating the District of Columbia water pollution control plant, Blue Plains, schedule of design and construction.

(The charts follow:)

DEPARTMENT OF SANITARY ENGINEERING
System Planning Division

## WATER POLLUTION CONTROL PLANT

### Total Estimated Cost to Expand and Upgrade Plant to 309 MGD

| | |
|---|---|
| Primary & Excess Flow | $ 19,042,000 |
| Sludge Processing | 27,930,000 |
| Secondary & Phosphorus | 61,274,000 |
| Additional BOD & Phosphorus | 161,054,000 |
| Nitrogen | 90,000,000 |
| Total | $359,300,000 |

### Estimated Annual Cash Flow by Fiscal Years Necessary to Meet Proposed Construction Schedule Based on 55% U. S. Grant, with Local and State Share Equal to 45% of Total Cost

| Fiscal Year | Total Estimated Cost | Fairfax Co. (8/309) at 2.59% of Local Share | W. S. S. C. (148/309) at 47.90% of Local Share | D.C. + P.I. (153/309) at 49.51% of Local Share |
|---|---|---|---|---|
| 1971 | $ 21,373,000 | $ 249,000 | $ 4,606,000 | $ 4,762,000 |
| 1972 | 80,108,000 | 933,000 | 17,266,000 | 17,849,000 |
| 1973 | 113,605,000 | 1,324,000 | 24,486,000 | 25,313,000 |
| 1974 | 114,627,000 | 1,335,000 | 24,706,000 | 25,541,000 |
| 1975 | 29,587,000 | 345,000 | 6,377,000 | 6,593,000 |
| Total | $359,300,000 | $4,186,000 | $77,441,000 | $80,058,000 |

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DEPARTMENT OF SANITARY ENGINEERING
System Planning Division

## WATER POLLUTION CONTROL PLANT

### Total Estimated Cost to Expand and Upgrade Plant to 309 MGD

| | |
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| Primary | $ 19,042,000 |
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| Additional BOD & Phosphorus | 161,054,000 |
| Nitrogen | 90,000,000 |
| Total | $359,300,000 |

### Estimated Fund Authorization by Fiscal Years Necessary to Meet Proposed Construction Schedule Based on 55% U. S. Grant, with Local and State Share Equal to 45% of Total Cost

| Fiscal Year | Total Estimated (100%) Cost | Fairfax Co. (8/309) at 2.59% of Local Share | W. S. S. C. (148/309) at 47.90% of Local Share | D.C. + P.I. (153/309) at 49.51% of Local Share |
|---|---|---|---|---|
| 1971 | $108,235,000 | $1,261,000 | $23,328,000 | $24,117,000 |
| 1972 | 138,160,000 | 1,610,000 | 29,778,000 | 30,784,000 |
| 1973 | 110,245,000 | 1,284,000 | 23,762,000 | 24,564,000 |
| 1974 | 2,660,000 | 31,000 | 573,000 | 593,000 |
| Total | $359,300,000 | $4,186,000 | $77,441,000 | $80,058,000 |

GJM:vfm
[illegible]-7-70

## DISTRICT OF COLUMBIA
## WATER POLLUTION CONTROL PLANT
## BLUE PLAINS
## SCHEDULE OF DESIGN AND CONSTRUCTION

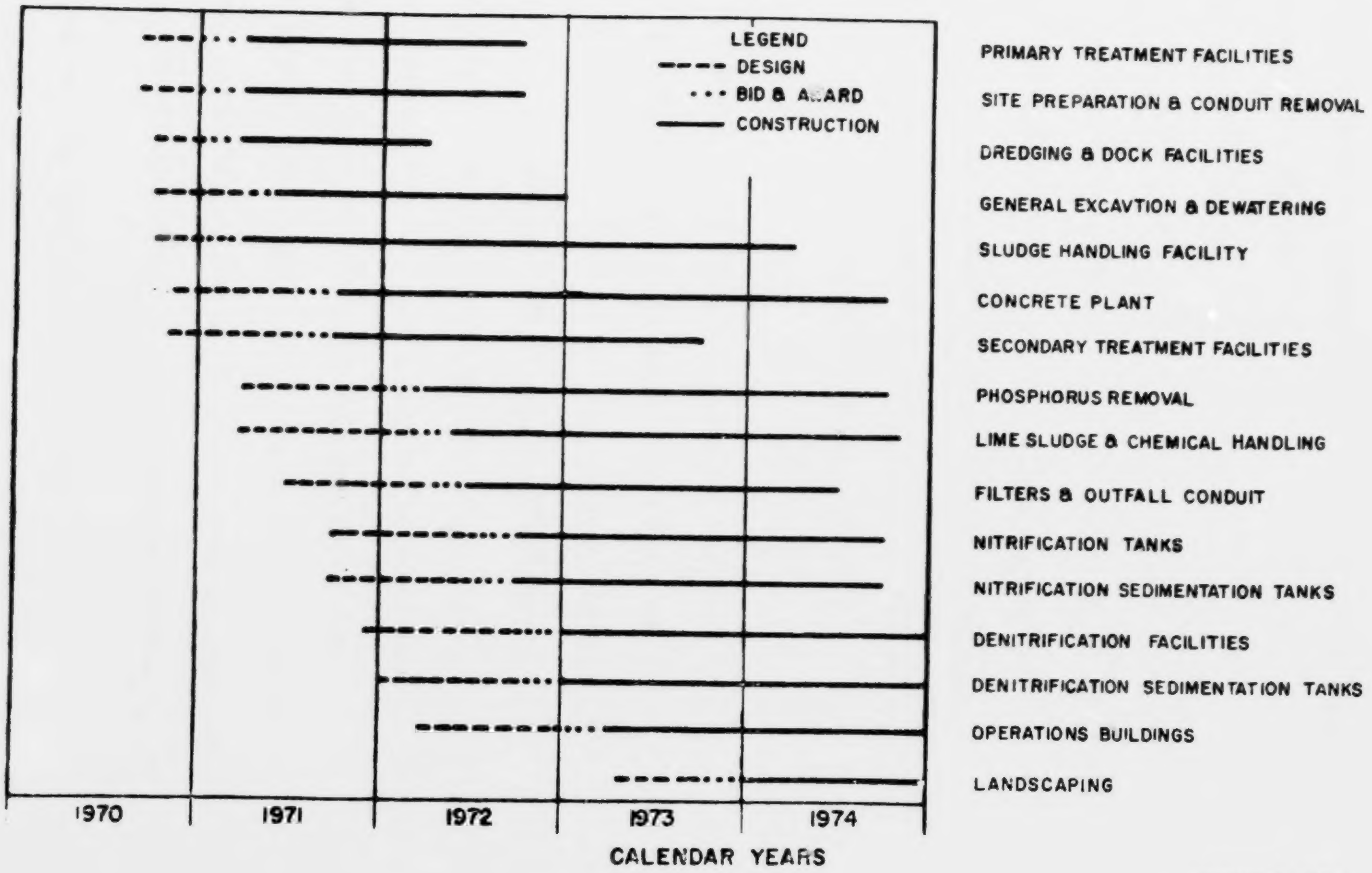


FIGURE NO.1

## Conclusions and Recommendations

3. The conferees believe that the completion of the Upper Potomac Interceptor Relief between 31st Street, N. W., and the Key Bridge is long overdue. The completion of this work is necessary to prevent the discharge of raw sewage into the Potomac River. The District of Columbia is requested to report to the conferees at their next quarterly meeting on a time schedule for the completion of this project. If a satisfactory time schedule is not developed, the conferees, at their next quarterly meeting, will consider recommending appropriate legal action to accomplish this result.

4. The conferees recommend that the U. S. Department of Agriculture, Agriculture Research Center, Prince Georges County, Maryland, provide waste treatment improvements in accordance with the following schedule:

| | |
|---|---|
| Complete Preliminary Plans by | 8-1-71 |
| Complete Final Plans by | 7-1-72 |
| Commence Construction by | 10-1-72 |
| Complete Construction by | 7-1-74 |

5. The conferees agree that, based upon studies by the Maryland Department of Water Resources and the Federal Water Quality Administration, Piscataway Bay is not as well suited as the Potomac River to receive treated waste

discharges regardless of the degree of treatment. Therefore it is recommended that the National Park Service grant a right-of-way for the immediate construction of an outfall to the main channel of the Potomac River from the Piscataway Water Pollution Control Plant to discharge wastewater having received tertiary treatment that will meet all of the Enforcement Conference requirements.

- - -

These conclude the recommendations and conclusions of the conferees. But in addition to that, and with the concurrence of the conferees, I am sending this letter to Mr. Noman Cole, Chairman of the Virginia Water Control Board.

(Letter to Mr. Cole follows:)

ENVIRONMENTAL PROTECTION AGENCY
Federal Water Quality Administration
Washington, D. C. 20460

December 9, 1970

Mr. Noman Cole
5917 River Drive
Lorton, Virginia 22079

Dear Mr. Cole:

At the December 8, 1970, progress meeting of the Potomac Enforcement Conference, it became evident to the conferees that a problem has arisen with respect to Fairfax County financing its share of the cost of expanding and upgrading the Blue Plains Sewage Treatment Plant. This problem apparently resulted through a misunderstanding of the intent of Paragraph 4 of the Memorandum of Understanding presented to the conferees at their special meeting on October 13, 1970.

Paragraph 4 of the Memorandum of Understanding states:

> "Plans will proceed on the basis that Federal funds, in the maximum amount provided by applicable legislation (currently amounting to 55% of the estimated cost of each portion of the work described in paragraph 1 above), will be awarded upon certification by the District of Columbia that all local contributions determined in accordance with paragraph 3 above are committed and available on request. The intent of this provision is that the District of Columbia will not finance the WSSC and Virginia (Pimmit Run only) shares. The Washington Suburban Sanitary Commission and Fairfax County (Pimmit Run only) will obligate their share of each project prior to the award of contracts. Funds will not be transferred, however, until required to make progress payments."

Federal participation at the 55 percent level now is predicated on the availability of matching grants from the District of Columbia, the State of Maryland, and the Commonwealth of Virginia, all of which at that time had a matching grant program. Appropriate financial commitments for the first contract have been received from all jurisdictions except Fairfax, County, Virginia.

The staff of the Virginia Water Control Board reports that State matching grant funds are not available for Fairfax County in Fiscal Year 1971. Therefore, the Federal Government, under the provisions of the Federal

Water Pollution Control Act, cannot make a 55 percent grant to Fairfax County as anticipated by the Memorandum of Understanding. It was assumed that appropriate funds would be made available by all jurisdictions to insure the maximum Federal Grant for this regional project.

In view of the above, and with knowledge of your intense interest in expediting a clean-up of the Potomac, the conferees have requested that the Acting Regional Director of the Middle Atlantic Region, Federal Water Quality Administration, meet with you as soon as possible in an effort to explore means of resolving this problem.

Sincerely yours.

Murray Stein
Chairman

I am signing this letter now for mailing to Mr. Cole.

I know we have the conferees and largely the staff here. I would like to thank you all for participating. I really do believe we have made a tremendous amount of progress at this meeting. Although, I think we must start coming to grips with the real hard problems that we are going to face if we are going to accomplish this. I don't think we have all the problems solved yet. The experience that we have had here today should indicate the necessity for setting up a technique and a methodology, so that we can avoid the same kind of problem in the future.

I want to say -- I said this the first day, but let me say it again -- this is such a complicated matter that I don't believe however well we consider this and however well we think we know each other, we can do business by letter, or at arm's length, or by just sending things back and forth and expecting it to happen.

I am urging that we all get together and try if we possibly can to come to an agreement orally, among ourselves -- and I mean an agreement by all parties concerned -- and then we sign off on that agreement.

I am going to make a pitch for something here that I don't believe I have ever done before because of the complicated nature of the problem. I think it would be foolhardy for any lawyer here to make a judgment on any one of these projects to move forward, without full consultation and sign-off by the engineers. By the same token, we have to get checks by the financial people. Neither should the engineers make an assumption that they can move without checking it and getting it signed off by the lawyers. We all have to do that if we are going to accomplish the desired result.

Now again I want to make something clear. We have had a misunderstanding of the Potomac River ever since we started that program in the fifties. I think that program was largely successful, and I know several people in the room were here all the way through. But now everyone says, "How come the river hasn't been cleaned up?" Well, the program wasn't designed to clean up the river. The program was designed to accomplish certain limited pollution abatement and it did it. That program never was designed to get silt out of the river. It never was designed to make this a clean and pristine river. It was designed to abate the sight and odor nuisance, cut down on the imminent health hazard, and improve the habitat for indigenous fish. That it did.

Now I would ask again that you recognize the letting of this first contract, with its attendant problems, is not a panacea that is going to clean up this river. The letting of this first contract is not going to take care of the legitimate expansions of Prince William County, of Loudoun County, of the further reaches of Montgomery County or Prince George's County. It is not designed to do that. It is designed to help us alleviate the immediate problem we have of overloading the Blue Plains Treatment Plant and that system there. That is all it is going to do. This is just one little step, but a crucial step and a first step to meeting the problem. But this is not -- I repeat not -- going to be the total answer to the area problem I hope no one will get in his mind. This problem has to be faced. But what we are talking about here today -- certainly I know in the conferees' minds -- does not address itself to the total problem.

Do the conferees or does anyone else want to say anything for the record?

MR. McKEE: Mr. Chairman, I think we ought to emphasize for the press the fact that we have, as a result of recommendations made, ironed out the funding dispute that was the headline in the press of this morning.

MR. STEIN: I should say -- and I know some people came in late -- we do have unanimous agreement among the conferees. I think the agreement will speak for itself, and we will be here to answer questions. I believe we met the funding dispute and the contract problem and came up with a program to meet it. Also we met the problem to upgrade and expand the Blue Plains plant within a compressed time schedule.

The District is indeed to be commended for its ingenuity, flexibility, and its engineers for working up this plan. Of course, the District has put many, many conditions on its plan if this accelerated time schedule is to be met. The conferees have accepted these conditions as being reasonable. Even granting all these conditions can be met, it will strain the goodwill and the ingenuity of all of us to see that the time schedule is met. But if we can't meet these conditions, I don't see how the District can possibly meet this time schedule. I am indeed grateful to the District officials for coming forward with this offer. I think this is environmental statesmanship of the first order and something for which you should be commended. I don't think we have had this kind of approach or cooperation from many cities in the country, and certainly on this the District is to be commended. This is a wonderful proposal, and I hope we can make it come true.

Are there any other comments?

(No response)

If not, we stand adjourned, and thank you all for coming.

(Whereupon, at 4:45 p.m., the meeting was adjourned.)

INTERSTATE COMMISSION ON THE POTOMAC RIVER BASIN

407 GLOBAL BUILDING
1025 VERMONT AVENUE, N.W., WASHINGTON, D. C. 20005
EXECUTIVE 3-1978—3-1979

FILE NO.

December 15, 1970

Grover W. Cook, Acting Director
Office of Enforcement and
Standards Compliance
U.S.D.I.
F.W.Q.A. - Middle Atlantic Region
918 Emmet Street
Charlottesville, Virginia 22901

Dear Grover:

I am enclosing a copy of our "Report on Recommendation 8", of the Washigton-Potomac Enforcement Conference. While I understand that this report was not presented to the December 8 Progress Meeting; you may wish to incorporate in the Meeting proceedings.

Very truly yours,

Carl

Carl J. Johnson
Executive Director

CJJ/CS
1 enclosure

## INTERSTATE COMMISSION ON THE POTOMAC RIVER BASIN

## REPORT ON RECOMMENDATION 8

Sediment control programs have been adopted in Montgomery and Prince Georges Counties, Maryland, in Fairfax County, Virginia, and in the District of Columbia.

Requirements and effectiveness vary due to the length of time the program has been in effect, manpower available and other factors; however, periodic evaluation and improvement are taking place which should result in greater effectiveness as these programs proceed.

The Metropolitan Council of Governments has reactivated its Sediment Control Advisory Committee, relating it closely to storm drainage. The work of this Committee should result in positive action in areas not having an organized sediment control program and should help to make current programs more effective.

Training programs and research relating to the effectiveness of practices, economics and monitoring are needed in this area.

12/7/70

COMMONWEALTH OF VIRGINIA **STATE WATER CONTROL BOARD**

EXECUTIVE SECRETARY
A. H. PAESSLER

P. O. BOX 11143 - RICHMOND, VIRGINIA 23230 - (703) 770-2241

**BOARD MEMBERS**

Noman M. Cole, Jr.
**Chairman**
Ray Edwards
Henry S. Holland III
Mrs. Beverly Holmberg
Andrew M. McThenia, Jr.
W. H. Singleton
Robert W. Spessard

January 17, 1971

Mr. Murray Stein
Environmental Protection Agency
Federal Water Quality Administration
Washington, D.C.

Dear Mr. Stein,

As you requested at the Potomac River Enforcement Conference on December 8, 1970, I am enclosing a copy of the final version of the report entitled "Tahoe East for the Occoquan." You have my permission to include this report in the minutes of the Enforcement Conference meeting. I hope other people may be able to benefit from the lessons of this study and use it effectively to solve the water quality problems in their areas.

Sincerely yours,

Noman M. Cole, Jr.

P.S. Glad the Blue Plains project is underway again!

CLEAN
STREAMS
PROVIDE
HEALTH
WEALTH
AND
RECREATION

# "TAHOE EAST"
# FOR THE
# OCCOQUAN RESERVOIR

JANUARY 15, 1971

N. M. Cole, Jr.

## ACKNOWLEDGEMENT

Assistance in obtaining data and ideas for this report is acknowledged:

1. To the firm of Metcalf and Eddy (M&E) who starting in 1968 performed the major studies on the Occoquan and who by direction developed a solution for the Occoquan based on the approach of exporting the waste. Without this basic ground work,the study covered herein could not have been undertaken. Further, it should be realized that without such a study as prepared by M&E, the people of the Occoquan watershed would never have been willing to consider a solution involving the clean-up of waste water for re-cycling. The study forced people to realize that the day of "exporting" waste rather than treating it was fast coming to an end.

2. To Messrs. Russell Culp, Manager of the Lake Tahoe Plant, Clair Sawyer of M&E, and Al West of FWQA, who gave freely of their time and knowledge and who are the exceptions among the people in the sanitary engineering field -- they have vision, imagination and the will to rise above the level of mediocrity which so prevails in that field today.

## INTRODUCTION

This document assumes that the reader has a general knowledge of Metcalf and Eddy studies on the Occoquan Reservoir. Further, this document is more of a "Summary Data Compilation Report" than a narrative type of document. As such, it basically includes only tables, graphs, listings, etc., for use with an oral presentation.

It is hoped that this document will give persons interested in the Occoquan Reservoir an insight into what modern technology can offer and provide as an alternative to the presently proposed export solution. The concept proposed herein is based on data, results, and operating experience which were not available at the time M&E made their study.

## IMPORTANT BACKGROUND ON BAR CHARTS, FIGURES AND DATA IN SECTION V

The reason for using a total output of 10 MGD and 40 MGD from the high performance plants in the information presented in Section V of this report is to:

1. Use comparable capacities as used in the M&E study and thus permit direct comparison of the "Treatment Approach" versus the "Export Approach."

2. Show the effects of discharges of high quality effluent into the reservoir at quantities comparable to M&E study.

The source of the ~10 MGD loading in 1970 to 1975 period and ~40 MGD loading in 1975 to 1985 period is the M&E study (see Table 1 in Section IV of this report).

Accordingly, in using 10 MGD and 40 MGD total treatment capacities, this is not to imply, in any way, that these are recommended capacities of this study or that only one plant would be involved. These capacities were selected solely to permit comparison with the M&E study.

## INDEX OF ITEMS TO BE COVERED IN PRESENTATION

I. Typical Conventional Sewage Plant and Terminology

II. Lake Tahoe Plant:
  A. Background and Plant Performance
  B. Film

III. Status of Occoquan Reservoir Today:
  A. Summary Table
  B. Bar Chart

IV. Metcalf and Eddy Study
  A. Proposal Concept: Export and Dilution Solution
  B. Cost

V. "Tahoe East" for the Occoquan: Clean-Up for Recycle Solution
  A What Would Such a Plant Look Like
    1. General Discussion of Plant Design Requirements
    2. One Line System Diagram
    3. A More Detailed Diagram Covering Reliability Features
    4. Minimum Effluent Quality Requirement for Such a Plant
  B. What Would This Type of Plant Do to the Occoquan Reservoir Water Quality?
    1. Water Quality Now
    2. With a 10 MGD - High Performance Plant
    3. With a 40 MGD - High Performance Plant
  C. 1. What Would it Cost?
    2. What are Overall Conclusions?
  D. Administrative Requirements for Controlling the Use of Such a Plant on a Water Supply

## BACKGROUND - I

## TYPICAL CONVENTIONAL SEWAGE PLANT AND TERMINOLOGY

## SEWAGE PLANT TERMS

1. MGD = Million Gallons per Day: (1 MGD ≈ 10,000 people)

2. 1 person ≈ 100 to 112 gallons per day

3. 2860 Homes ≈ 10,000 people ≈ 1 MGD (3.4 people per house)

4. A million gallons = a strip of water 10 feet wide, 1 foot deep and 2-1/2 miles long

5. $BOD_5$ = Five Day Biochemical Oxygen Demand

6. C.O.D. = Chemical Oxygen Demand

7. MBAS = Methylene Blue Absorbable Substances - Primarily a measure of synthetic detergent removal

8. T.O.C. = Total Organic Carbon

9. S.S. = Suspended Solids

10. T.D.S. = Total Dissolved Solids (e.g., salts)

11. Coliform = Test of Bacteria Content; Usually raw sewage has 10 to 50 x $10^6$ coliforms per 100 ML sample; Normally 1000 coliforms per 100 ML sample is considered safe for swimming.

12. Turbidity = The Clarity of the Water Color; Usually measured in Jax units

13. P = Phosphorus

14. N = Nitrogen

15. D.O. = Dissolved Oxygen

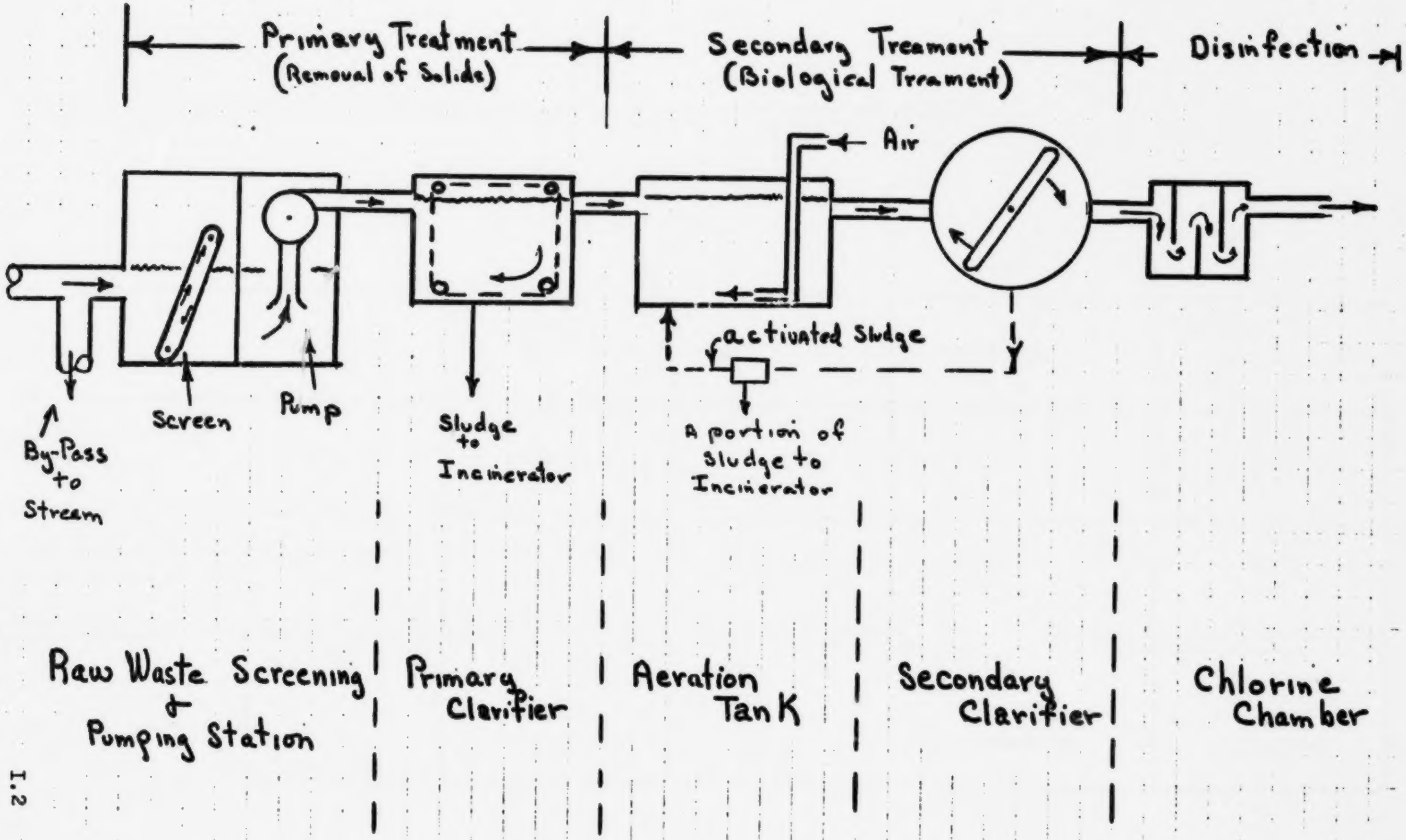
16. PPM = Parts per Million

17. Mg/L = Milligrams per Liter (1ppm = 1 Mg/L)

18. lbs. per Day = 8.316 x Mg/L x MGD

19. UOD = Ultimate Oxygen Demand. UOD is the sum of 1.45 times the $BOD_5$ plus 4.57 times the unoxidized nitrogen.

# Typical Activated Sludge Plant


Primary Treatment
(Removal of Solids)
Secondary Treament
(Biological Trament)
Disinfection
Air
By-Pass to Stream
Screen
Pump
Sludge to Incinerator
activated Sludge
A portion of Sludge to Incinerator
Raw Waste Screening & Pumping Station
Primary Clarifier
Aeration Tank
Secondary Clarifier
Chlorine Chamber

I.2

## TABLE I. A

## TYPICAL MODERN SECONDARY TREATMENT PLANT*
## ACTIVATED SLUDGE

|  | BOD Mg/Liter | Suspended Solids Mg/Liter | COD Mg/Liter | Phosphorous Mg/Liter | Turbidity Jax Units |
|---|---|---|---|---|---|
| Raw Sewage (Before Treatment) | 200 to 300 | 200 to 400 | 300 to 700 | 12 to 15 | 100+ |
| Final Effluent (After Treatment) | 15 to 30 | 20 to 40 | 80 to 250 | 6 to 9 | 3 to 10 |
| Approximate % Removals | 90 to 95% | 90 to 95% | 60 to 85% | 30 to 50% | 90 to 97% |

Note: 1 Mg/Liter = 1 ppm

---

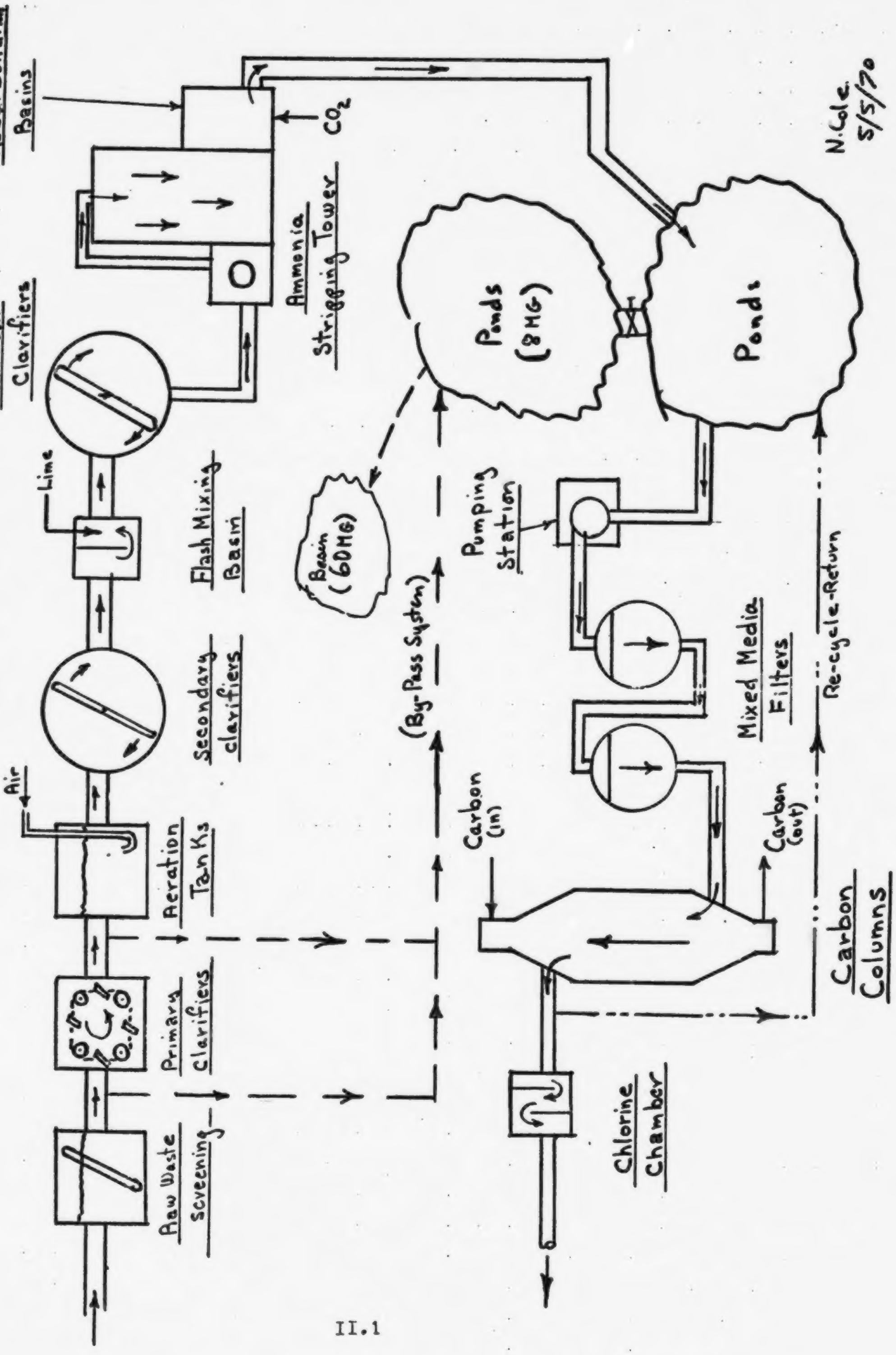
* Probably not more than 3 to 6 such plants in the of Virginia of 2 MGD or more.

## II

## LAKE TAHOE SEWAGE PLANT DATA

## CLEAN WATER - "IT CAN BE DONE AND THEY HAVE PROVED IT"

## Lake Tahoe Plant - 7.5 MGD


Raw Waste screening
Primary clarifiers
Air
Aeration Tanks
Secondary clarifiers
Lime
Flash Mixing Basin
Chemical Clarifiers
Ammonia Stripping Tower
3-Section Recarbonation Basins
CO$_2$
(By-Pass System)
Basin (60 MG)
Ponds (8 MG)
Ponds
Pumping Station
Mixed Media Filters
Re-cycle-Return
Carbon (in)
Carbon (out)
Carbon Columns
Chlorine Chamber

N. Cole
5/5/70

II.1

# Lake Tahoe Performance Data

| Period Covered | Daily Average flow -MGD- | Percentage Removed<br>%BOD | %COD | % Suspended Solids Removed | Phosphorus % | MBAS % | Turbidity % Reduction in Jax Units | Colifor per 100/ML |
|---|---|---|---|---|---|---|---|---|
| Three Month Period (Dec, Jan + Feb 1970) | 2.4MGD | 99.7% | 98.5% | ~100% | 98.6% | 99.3% | 99.8% | Less than 2 |
| Five Month Period (Oct 69 thr Feb 1970) | 2.1MGD | 99.7% | 98% | ~100% | 99.17% | 98.8% | 99.86% | Less than 2 |

Lake Tahoe Plant – Background.

(a) Initral 2.5 MGD Secondary System (Like the new Pohick Plant was completed in 1960

(b). 2.5MGD Tertiary Treatment Test Plant Completed = 1965

(c). 7.5MGD Tertiary Treatment Plant Completed = March 1968

I. Nitrogem Renoval – (a). 98% Removal — when temperature 70 to 80+°F
(b). 60% Removal @ 32°F (Avg) – high as 88%

II (A). MGD = Millions Gallons per Day
(B). BOD = Biochemical Oxygen Demand
(C). COD = Chemical Oxygen Demand
(D). MBAS = Methylene Blue Absorbable substances: Primarily a measure of synthetic detergent Removal.
(E). Turbidity = Clarity of the water; usual measured in Jax units
(F). Coliforms = Test of Bacteria Content; Usual incoming sewage has 10 to $50 \times 10^6$ Coliforms per 100 ML Sample; Normally 1000 Coliforms per 100 ML Sample is considered safe for swimming.

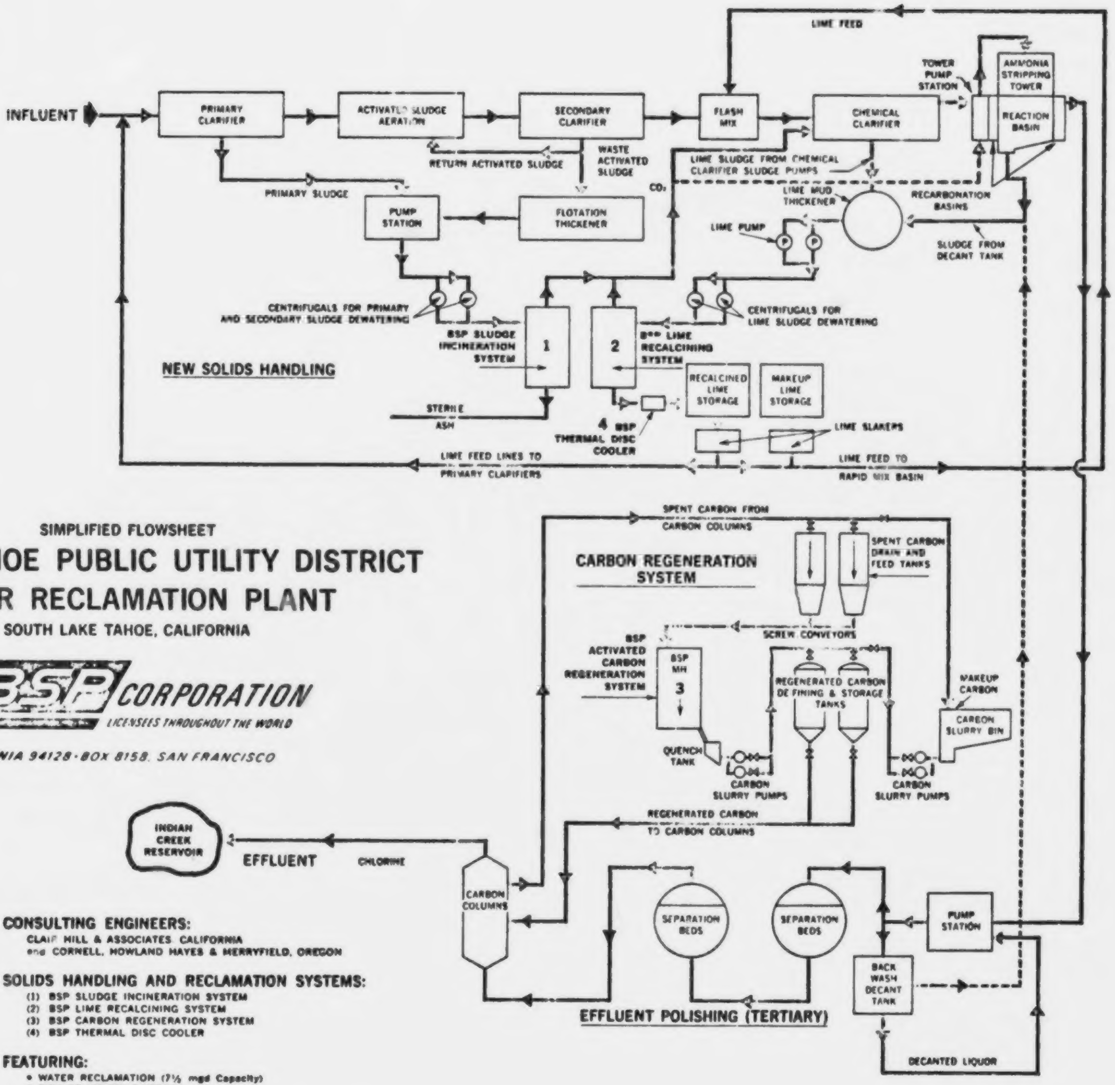
N. Cole
5/5/70

# Lake Tahoe - 7.5 MGD Plant

| | BOD Mg/L | COD Mg/L | SS Mg/L | Phosphorus Mg/L | Turbidity Jax Units | MBAS Mg/L |
|---|---|---|---|---|---|---|
| Raw Sewage | ~300 | ~350<br>to<br>~550 | ~250 | 12 to 15 | 100+ | 7-9 |
| Treated Effluent | | | | | | |
| 5 Month Average Oct 69 thru Feb 70 | .95 | 6.8 | 0 | .14 | .40 | .08 |
| 11 Month Average Oct 69 thru Aug 70 | 1.62 | 9.5 | 0 | .15 | .38 | .17 |

Note Mg/L = ppm

BSP ECOLOGIX SYSTEMS


INFLUENT
PRIMARY CLARIFIER
ACTIVATED SLUDGE AERATION
SECONDARY CLARIFIER
FLASH MIX
CHEMICAL CLARIFIER
LIME FEED
TOWER PUMP STATION
AMMONIA STRIPPING TOWER
REACTION BASIN
RETURN ACTIVATED SLUDGE
WASTE ACTIVATED SLUDGE
PRIMARY SLUDGE
$CO_2$
LIME SLUDGE FROM CHEMICAL CLARIFIER SLUDGE PUMPS
LIME MUD THICKENER
RECARBONATION BASINS
SLUDGE FROM DECANT TANK
LIME PUMP
PUMP STATION
FLOTATION THICKENER
CENTRIFUGALS FOR PRIMARY AND SECONDARY SLUDGE DEWATERING
CENTRIFUGALS FOR LIME SLUDGE DEWATERING
BSP SLUDGE INCINERATION SYSTEM
1
2
B** LIME RECALCINING SYSTEM
RECALCINED LIME STORAGE
MAKEUP LIME STORAGE
NEW SOLIDS HANDLING
STERILE ASH
4 BSP THERMAL DISC COOLER
LIME SLAKERS
LIME FEED LINES TO PRIMARY CLARIFIERS
LIME FEED TO RAPID MIX BASIN
SPENT CARBON FROM CARBON COLUMNS
CARBON REGENERATION SYSTEM
SPENT CARBON DRAIN AND FEED TANKS
SCREW CONVEYORS
BSP ACTIVATED CARBON REGENERATION SYSTEM
BSP MH
3
QUENCH TANK
REGENERATED CARBON DE FINING & STORAGE TANKS
MAKEUP CARBON
CARBON SLURRY BIN
CARBON SLURRY PUMPS
CARBON SLURRY PUMPS
REGENERATED CARBON TO CARBON COLUMNS
INDIAN CREEK RESERVOIR
EFFLUENT
CHLORINE
CARBON COLUMNS
SEPARATION BEDS
SEPARATION BEDS
PUMP STATION
BACK WASH DECANT TANK
DECANTED LIQUOR
EFFLUENT POLISHING (TERTIARY)

SIMPLIFIED FLOWSHEET

## SOUTH TAHOE PUBLIC UTILITY DISTRICT WATER RECLAMATION PLANT

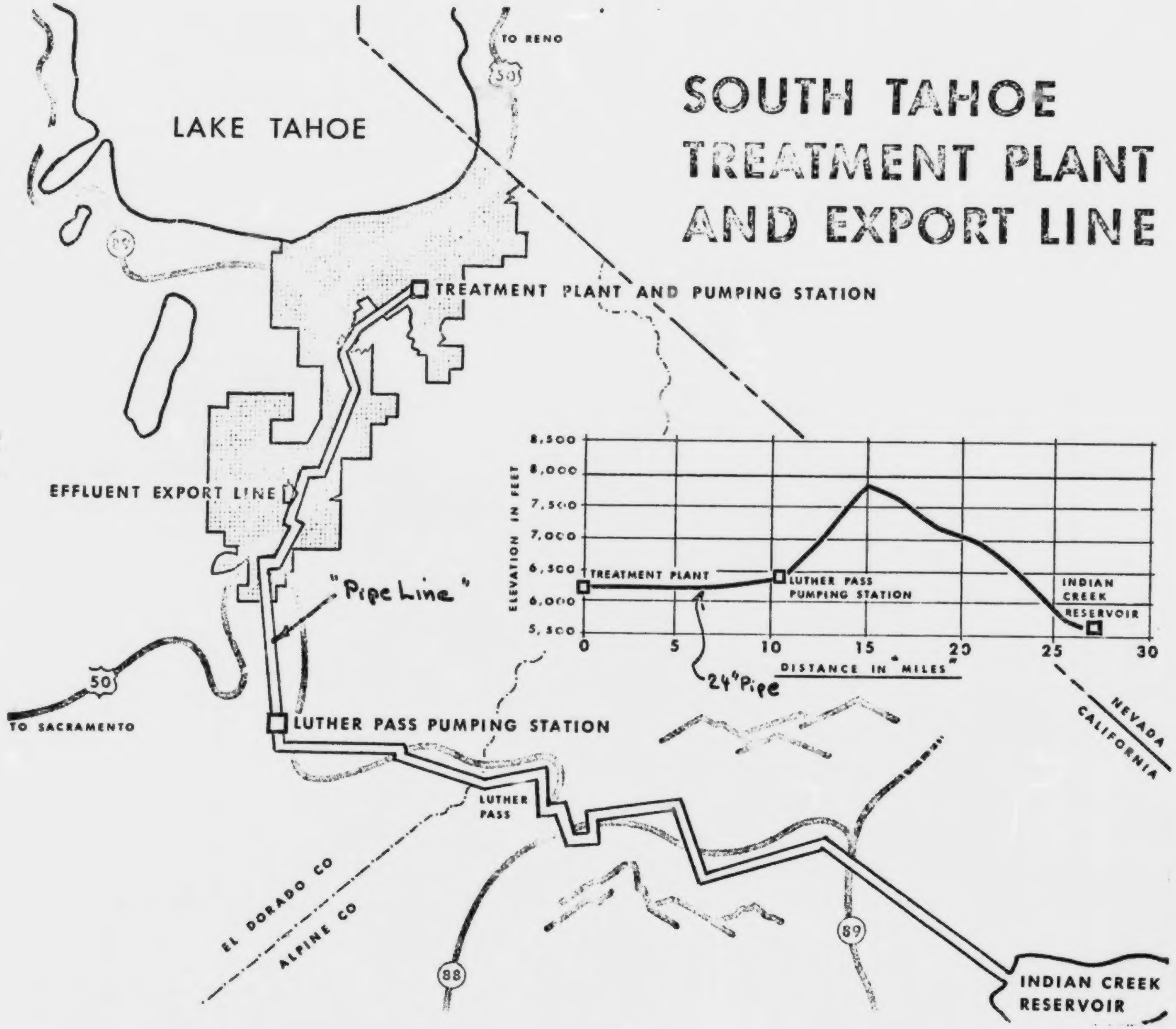
SOUTH LAKE TAHOE, CALIFORNIA

BSP CORPORATION
LICENSEES THROUGHOUT THE WORLD
CALIFORNIA 94128 · BOX 8158, SAN FRANCISCO

**CONSULTING ENGINEERS:**
CLAIR HILL & ASSOCIATES CALIFORNIA
and CORNELL, HOWLAND HAYES & MERRYFIELD, OREGON

**SOLIDS HANDLING AND RECLAMATION SYSTEMS:**
(1) BSP SLUDGE INCINERATION SYSTEM
(2) BSP LIME RECALCINING SYSTEM
(3) BSP CARBON REGENERATION SYSTEM
(4) BSP THERMAL DISC COOLER

**FEATURING:**
- WATER RECLAMATION (7½ mgd Capacity)
- SEWAGE SOLIDS DISPOSAL — plumeless
- LIME COAGULATION RECOVERY AND RE-USE
- ACTIVATED CARBON REGENERATION AND RE-USE



# SOUTH TAHOE TREATMENT PLANT AND EXPORT LINE

LAKE TAHOE
TO RENO
50
89
TREATMENT PLANT AND PUMPING STATION
EFFLUENT EXPORT LINE
"Pipe Line"
50
TO SACRAMENTO
LUTHER PASS PUMPING STATION
LUTHER PASS
EL DORADO CO
ALPINE CO
88
89
INDIAN CREEK RESERVOIR
NEVADA
CALIFORNIA
ELEVATION IN FEET
8,500
8,000
7,500
7,000
6,500
6,000
5,500
TREATMENT PLANT
LUTHER PASS PUMPING STATION
INDIAN CREEK RESERVOIR
0
5
10
15
20
25
30
DISTANCE IN "MILES"
24" Pipe

## TABLE II

## SOUTH TAHOE PUBLIC UTILITY DISTRICT, CALIFORNIA
## CAPITAL COSTS FOR CONVENTIONAL AND ADVANCED WASTE TREATMENT PLANT
## 7.5 MGD DESIGN CAPACITY [1]

| Treatment Phase | Actual Contract Total Construction Cost Per Phase [2] | Estimated National Average Replacement Construction Cost for 1969 [3] | Estimated Replacement Costs Per MG for 1969 [4] | May 1969 Oper. Cost at Design —Flow— Cost per MG |
|---|---|---|---|---|
| **CONVENTIONAL TREATMENT** | | | | |
| Primary | $ 692,000 | $ 753,000 | $ 19.50 | |
| Activated Sludge | 1,247,000 | 1,300,000 | 33.60 | |
| Organic Sludge [5] | 583,000 | 545,000 | 14.10 | |
| Chlorination | 9,000 | 11,000 | 0.30 | |
| TOTAL, Conventional Treatment | $2,531,000 | $2,609,000 | $ 67.50 | $109.00 |
| (Cost per MGD) | | (~$350,000) | | |
| **ADVANCED TREATMENT** | | | | |
| Nutrient Removal | | | | |
| Phosphorus Removal | | | | |
| Lime Treatment | 401,000 | 378,000 | 9.70 | |
| Lime Recalcining [6] | 552,000 | 516,000 | 13.50 | |
| SUBTOTAL, Phosphorus Removal | $ 953,000 | $ 894,000 | $ 23.20 | |
| Nitrogen Removal [7] | 327,000 | 310,000 | 8.00 | |
| Recarbonation | 162,000 | 152,000 | 4.00 | |
| SUBTOTAL, Nutrient Removal | $1,442,000 | $1,356,000 | $ 35.20 | |
| Filtration | 705,000 | 687,000 | 17.80 | |
| Carbon Treatment | | | | |
| Carbon Adsorption [8] | 656,000 | 632,000 | 16.30 | |
| Carbon Regeneration | 193,000 | 199,000 | 5.20 | |
| SUBTOTAL, Carbon Treatment | $ 849,000 | $ 831,000 | $ 21.50 | |
| TOTAL, Advanced Treatment | $2,996,000 | $2,874,000 | $ 74.50 | $133.00 |
| (Cost per MGD) | | (~$380,000) | | |
| **TOTAL WATER RECLAMATION** | | | | |
| Conventional Treatment | 2,531,000 | 2,609,000 | 67.50 | |
| Advanced Treatment | 2,996,000 | 2,874,000 | 74.50 | |
| TOTAL, WATER RECLAMATION | $5,527,000 | $5,483,000 | $142.00 | $242.00 |
| (Cost per MGD) | | (~$730,000) | | |

---

[1] Includes all equipment and construction costs. Does not include design costs.

[2] Construction costs are taken from District records of actual contracts awarded for various phases. Contracts for construction were completed at various periods between 1960 and 1968. These costs have not been adjusted to a common year.

[3] National average replacement costs are the actual contract costs, for each year of construction, adjusted to 1969. Adjustments were made using the FWPCA Sewage Treatment Plant Construction Cost Index, Base Year 1957–59= 100. Estimated 1969 index values were 136.2 for the San Francisco Region and 127.1 for the Nation. The San Francisco Regional Index was used for the South Tahoe area.

[4] Computed from National average 1969 replacement costs assuming capital amortization of total costs at 5% interest for 25 years.

[5] Includes sludge handling, dewatering, incineration, and ash disposal.

[6] Includes lime mud handling, dewatering, and recalcining.

[7] Ammonia stripping.

[8] Includes initial carbon costs to fill all carbon columns.

[9] Federal grants from the USPHS, FWPCA, and EDA financed approximately 46% of the total construction cost.

# III

# STATUS OF OCCOQUAN RESERVOIR TODAY

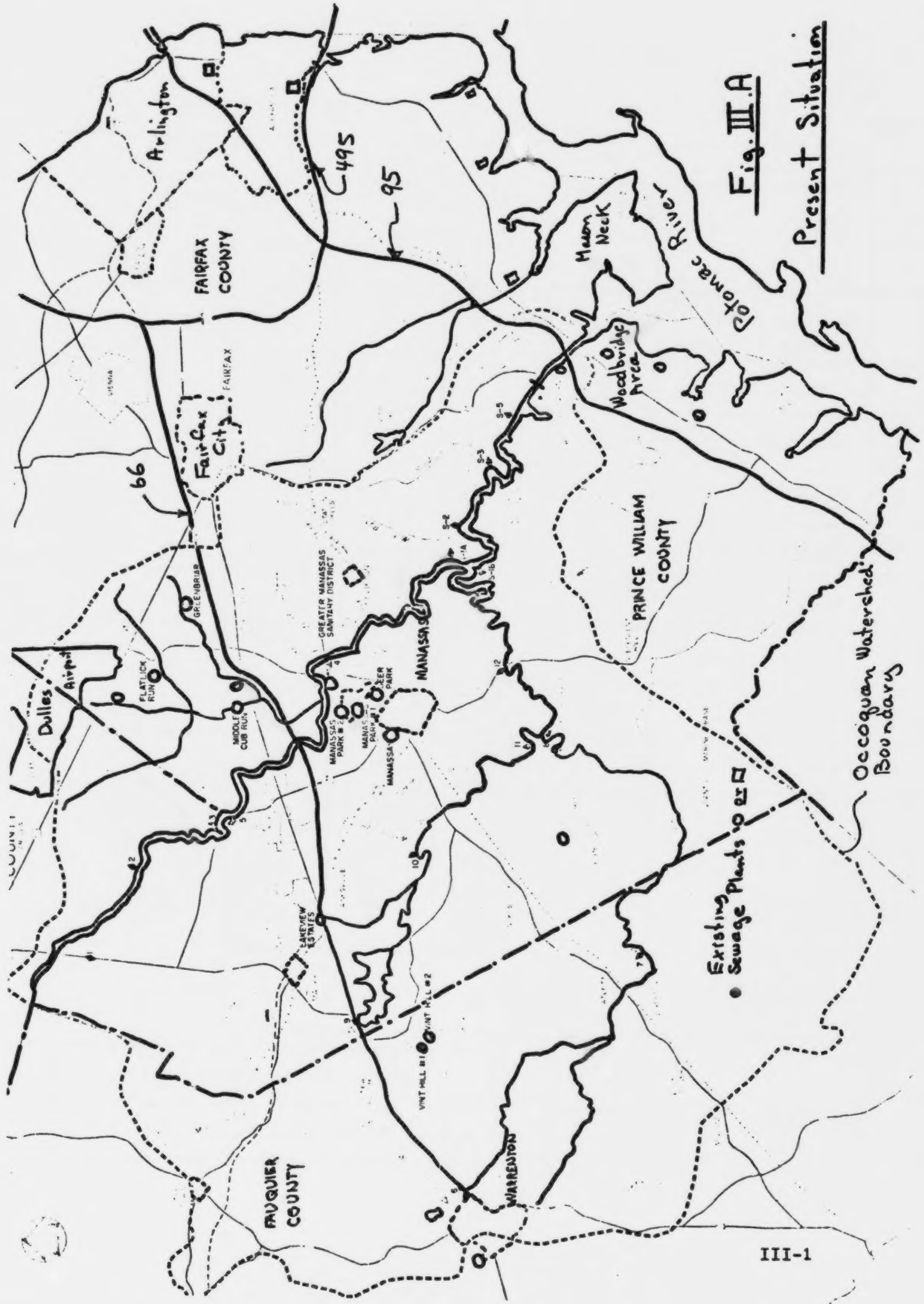

Arlington
FAIRFAX COUNTY
495
95
Mason Neck
Potomac River
Woodbridge Area
Fairfax City
FAIRFAX
VIENNA
66
PRINCE WILLIAM COUNTY
GREATER MANASSAS SANITARY DISTRICT
MANASSAS
MANASSAS PARK #2
MANASSAS PARK #1
DEER PARK
GREENBRIAR
FLAT LICK RUN
MIDDLE CUB RUN
Dulles Airport
LAKEVIEW ESTATES
VINT HILL #1
VINT HILL #2
WARRENTON
FAUQUIER COUNTY
Existing Sewage Plants
Occoquan Watershed Boundary

Fig. III.A

Present Situation

## Table # III.A
## Occoquan Watershed
- Present -
## BOD, Phosphorus, and Nitrogen Loading (A)
-1970-

| | Column → | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| | Plant | Actual Average Flow MGD | BOD$_5$ lbs/day | Phosphorus -P- lbs/day | Nitrogen -N- lbs/day | Mg/L as N + P From Metcalf + Eddy<br>-P- Mg/L | -N- Mg/L |
| 1 | Fairfax County (B) (see tables 3.3 & 3.4) | .82 | 2.45 | 111 | 161 | — | — |
| 2 | Deer Park | .07 | 9 | 1 | 2 | 1.2 | 3.85 |
| 3 | GMSD | 1.20 | 327 | 98 | 210 | 9.9 | 21.2 |
| 4 | Lake view Estates | .03 | D | 2 | 2 | 6.4 | 9.8 |
| 5 | Manassas | .87 | 218 | 84 | 213 | 11.6 | 29.3 |
| 6 | Manassas Park #1 (C) | .17 | (D) | 22 | 47 | 15.8 | 33.7 |
| 7 | Manassas Park #2 (C) | .13 | (D) | 16 | 19 | 14.6 | 13.3 |
| 8 | Vint Hill #1 | .06 | 10 | 6 | 13 | 11.3 | 25.0 |
| 9 | Vint Hill #2 | .08 | 17 | 10 | 12 | 14.1 | 16.5 |
| 10 (1-9) | Sub-Total of Plants Covered by M&E Study | 3.43 | 950 (826+124)$^D$ | 350 | 679 | | |
| 11 | Other Small Plants (Estimated) (E) | .9 | 260 | 90 | 234 | | |
| 12 (10+11) | Grand Total (F) | 4.3 | 1,210 | 440 | 913 | | |

↑ Million Gallons per Day

Waste Water (sewage) Presently Being Re-cycled into Drinking Water in the Occoquan Reservoir

For Notes see next page

## Notes for Table #III.A (continued)

A. General - data is based on 12 month Averages unless otherwise noted. (Sept 69 - thru - Aug 1970)

B. Fairfax County data based on 8 month Averages (March-70 thru Oct 70) and only includes waste from their Flatlick, Greenbriar and Middle Cub Plants. Data Source: G.J. Kelley's letter of 11/13/70 to N.Cole. See Tables III.C & III.D.

C. Data Based on 5 month Average (April 70 - thru - Aug 70)

D. These plants have a total flow of .33 MGD. To estimate the lbs of $BOD_5$ per day contributed to the Occoquan Reservoir from these plants, the BOD effluent was assumed to have 45 mg/L of $BOD_5$ (note: this probably a low estimate for these plants). On this bases the lbs of BOD per day is:

$$\text{lb of BOD}/\text{Day} = .33\ \text{MGD} \times 45\ \text{mg/L} \times 8.316 = 124\ \text{lb/day}$$

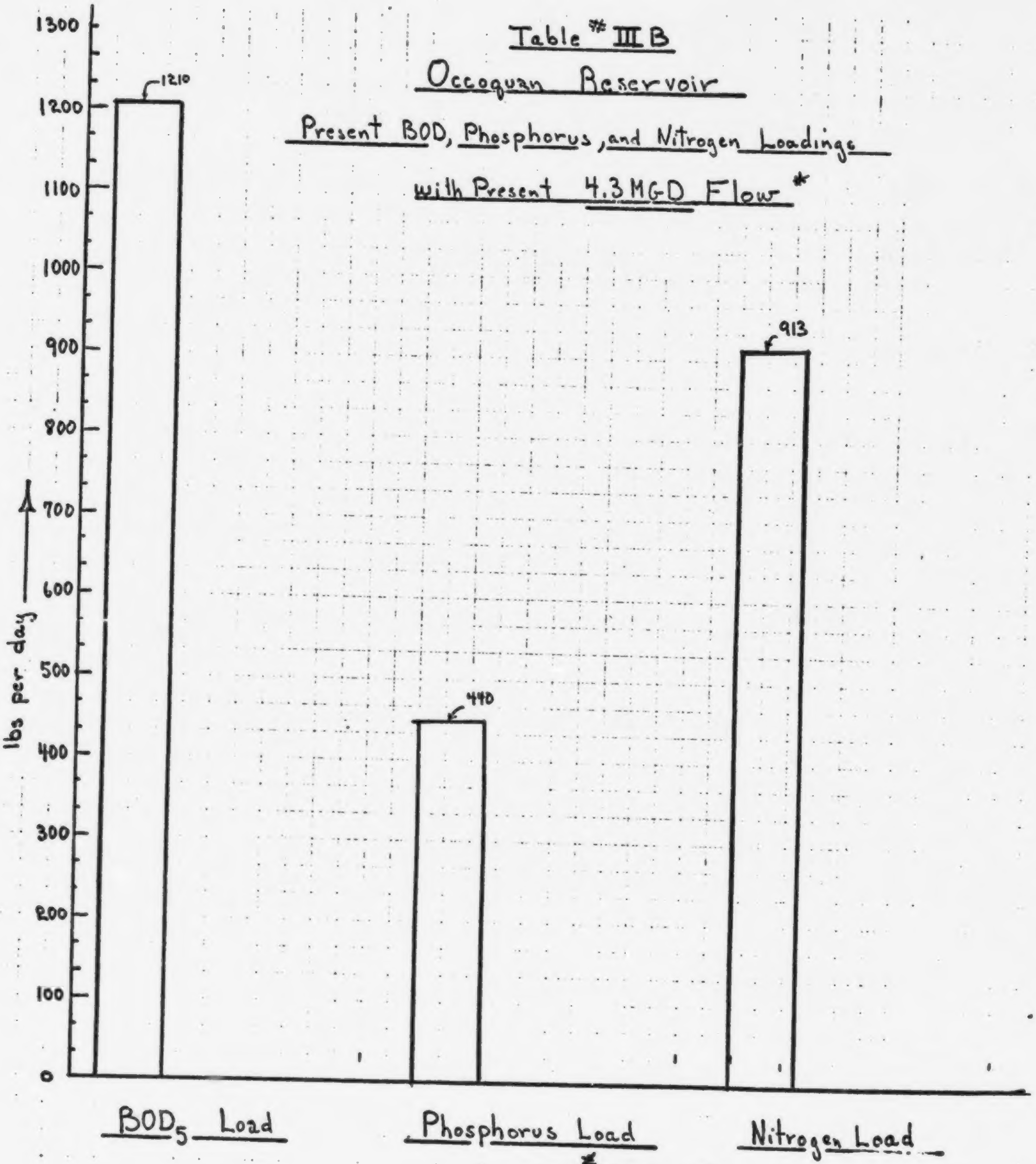
E. The waste from these plants based on the following:

1. Estimated Flow
   a). Loch Lomond Plant, Big Rocky, Liberia = .6
   b). Schools and other small sources in the Fairfax County & Manassas = .3
   .9 MGD

2. Estimated Waste
   (a) lbs of BOD per day = .90 × 35 mg/L × 8.3 = 260
   (b) lbs of P per day = .90 × 12 mg/L × 8.3 = 90
   (c). lbs of N per day = .90 × 30 mg/L × 8.3 = 234

F. Grand Total does not include approximately $.5^{+}$ MGD from Warrenton & Fauquier County areas.

## Table # III B
## Occoquan Reservoir
### Present BOD, Phosphorus, and Nitrogen Loadings with Present 4.3 MGD Flow *



* See Table III A, Line #12.

# Table *III.C

FAIRFAX COUNTY

POUNDS BOD PER DAY TO OCCOQUAN WATERSHED*

| DATE | FLATLICK | | | | GREENBRIAR | | | | MIDDLE CUB | | | | BIG ROCKY* | Total Avg. Flow | TOTAL BOD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1970 | Flow mgd | Inf. BOD mg/1 | Eff. BOD mg/1 | Eff. BOD lbs/day | Flow mgd | Inf.BOD mg/1 | EFF.BOD mg/1 | EFF.BOD lbs/day | Flow mgd | Inf.BOD mg/1 | Eff. BOD mg/1 | Eff. BOD lbs/day | | MGD | lbs. per day |
| Mar. | 0.1174 | 217 | 44 | 43.1 | 0.2880 | 246 | 22 | 52.9 | 0.3880 | 262 | 52 | 168.4 | | | 264.4 |
| April | 0.1624 | 225 | 59 | 79.9 | 0.3450 | 226 | 14 | 40.3 | 0.4250 | 235 | 69 | 244.7 | | | 364.9 |
| May | 0.1173 | 207 | 41 | 40.1 | 0.3192 | 263 | 40 | 106.5 | 0.2853 | 238 | 51 | 121.4 | | | 268.0 |
| June | 0.1335 | 235 | 20 | 22.3 | 0.3118 | 169 | 16 | 41.6 | 0.3431 | 196 | 40 | 114.5 | | | 178.4 |
| July | 0.1989 | 191 | 13 | 21.6 | 0.4108 | 194 | 9 | 30.8 | 0.3417 | 225 | 7 | 19.9** | | | 72.3** |
| Aug. | 0.1860 | 277 | 39 | 60.5 | 0.3510 | 187 | 12 | 35.1 | 0.2870 | 245 | 43 | 103.0 | | | 198.6 |
| Sept. | 0.1420 | 300 | 34 | 40.3 | 0.3070 | 205 | 19.5 | 50.0 | 0.3050 | 260 | 34 | 86.5 | | | 176.8 |
| Oct. | 0.1670 | 327 | 21 | 29.3 | 0.3160 | 267 | 33 | 87.0 | 0.3410 | 270 | 54 | 153.7 | | | 270.0 |
| | .15 | | | | .33 | | | | .34 | | | | | .82 | ~245 |

* The Big Rocky plant just recently went on line. Plant flow is not yet significant and influent and effluent laboratory test results are not yet available.

** Data is questionable; therefore not used

* Data Source: G. J. Kelley's 11/13/70 letter to N. Cole

# Table #III.D

## Fairfax County's Phosphorus & Nitrogen Contribution to the Occoquan(A)

|  | Plant | Average Flow — MGD | Phosphorus -P- lbs/day | Nitrogen -N- lbs/day | Mg/L as N & P from Metcalf & Eddy Report |  |
|---|---|---|---|---|---|---|
|  |  |  |  |  | -P- Mg/L | -N- Mg/L |
| 1 | Flatlick | .15 | 24 | 35 | 19 | 28 |
| 2 | Greenbriar | .33 | 33 | 36 | 12 | 13 |
| 3 | Middle Club | .34 | 54 | 90 | 19 | 32 |
| 4 | Total of Fairfax C.(B) | .82 | 111 | 161 | — | — |

**Notes:**

A. Data Source: G. J. Kelley's letter 11/13/70 to N. Cole; This data is based on 8 month average (March 70 thru Oct 70): See Table* __

B. There are a number of other small sources in Fairfax County; Further the Big Rocky Plant has recently started, However flow is still quite low and laboratory test results are not yet available

11/14/70

## IV

## METCALF AND EDDY PROPOSED CONCEPT

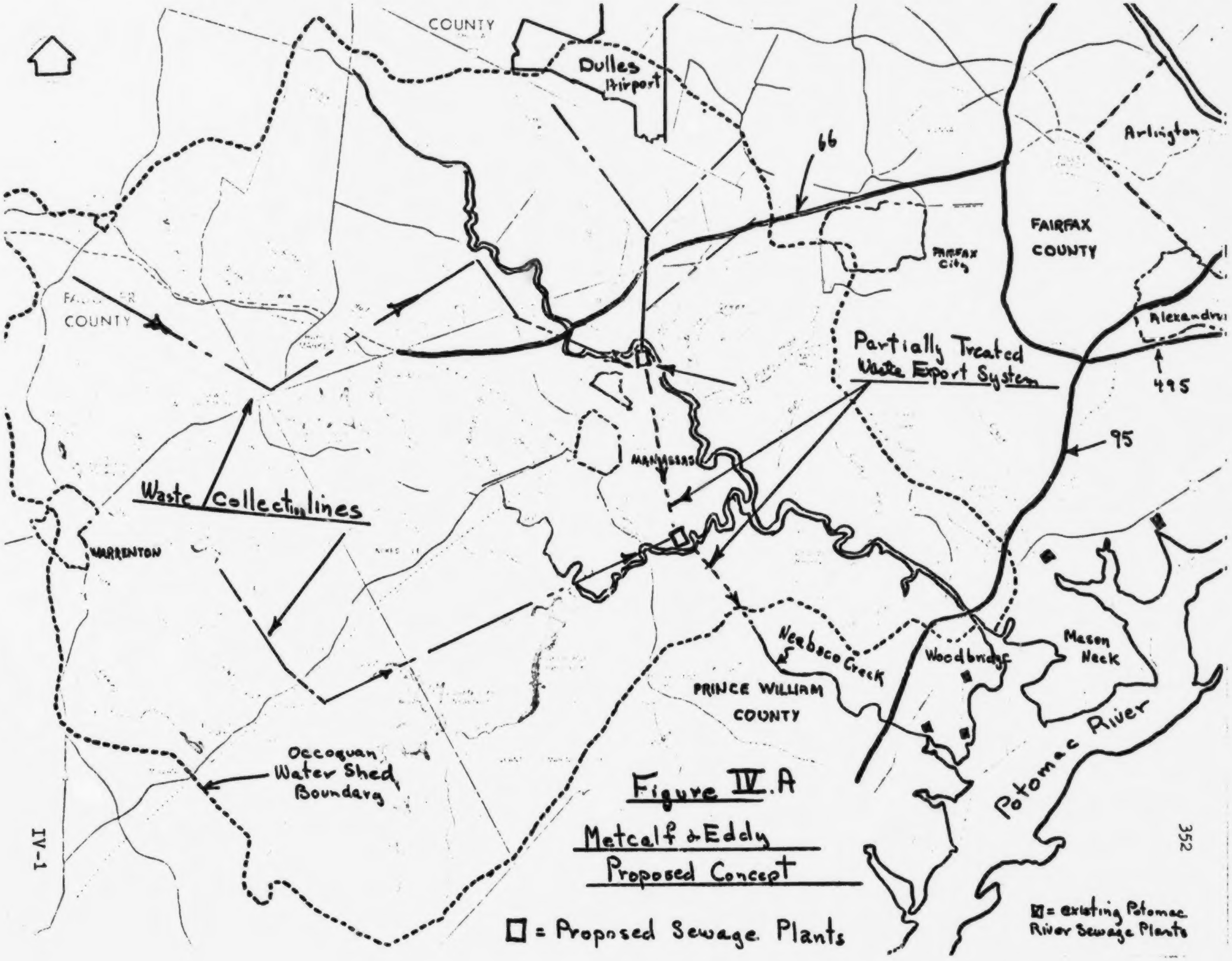

COUNTY
Dulles Airport
66
Arlington
FAIRFAX COUNTY
FAIRFAX City
Alexandria
495
95
FAUQUIER COUNTY
Partially Treated Waste Export System
MANASSAS
Waste Collectin lines
WARRENTON
Neabsco Creek
Woodbridge
Mason Neck
PRINCE WILLIAM COUNTY
Potomac River
Occoquan Water Shed Boundary
☒ = existing Potomac River Sewage Plants
☐ = Proposed Sewage Plants

Figure IV.A

Metcalf & Eddy

Proposed Concept

# Table IV.A

TOTAL REGIONAL SYSTEM

| SEWAGE TREATMENT PLANT PERFORMANCE | | |
|---|---|---|
| PERIOD | 1970-75(1) | 1980-2000(2) |
| REMOVED | | |
| PERCENT BOD | 90 | 98 |
| PERCENT COD | 80 | 95 |
| PERCENT P. | 85 | 90 |
| PERCENT N. | 25 | 90 |

(Note: 40MGD Projected from 1970 to 1985)

| | PHASE 1<br>1970 | | PHASE 2<br>1975 | | PHASE 3<br>1980 | | PHASE 4<br>1985 | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | COST IN $1,000 |
| | | | | | | | | | Total (90MGD) |
| MANASSAS PLANT | 9(3) | 8,448 | 23(4) | 31,872 | | | 40(5) | 32,600 | 72.920 |
| OCCOQUAN PLANT | 2(3) | 3,345 | 6(4) | 9.985 | | | 10(5) | 10,680 | 24.010 |
| | 11MGD | | 29MGD | | | | | | $~1 per MGD |
| INTERCEPTOR SYSTEMS | | | | | | | | | |
| FLAT BRANCH SYSTEM | 25(7) | 3.660 | | | | | | | 3.660 |
| CUB RUN SYSTEM | 82(7) | 21,510* | | | | | | | * 21.510 |
| LOUDOUN COUNTY SYSTEM | | | 17(7) | 2,780 | | | | | 2.780 |
| BULL RUN SYSTEM | 194(7) | 3,780* | 87(7) | 15.050* | 31(7) | 11,780* | | *$64 | 30 610 |
| CEDAR RUN SYSTEM | 77(7) | 9,610* | 58(7) | 2.660* | 45(7) | 21.290* | | | 33.560 |
| YORKSHIRE SYSTEM | 9(7) | 4.620 | | | | | | | 4.620 |
| EFFLUENT TRANSFER SYSTEM | | $18.3 | | $6.3 | | $.4 | | $9.3 | $34 |
| A. MANASSAS PUMPING STATION | | | | | | | | | |
| 1. STATION | 15.5(8) | 2.524 | 19.4(9) | 177 | 19.9(10) | 182 | 69.3(11) | 479 | 3.362 |
| 2. FORCE MAIN | 15.5(8) | 4.092 | 39.2(10) | 4.092 | | | 69.3(11) | 5.671 | 13.855 |
| 3. GRAVITY SEWER | 140(7) | 2.920 | | | | | | | 2.920 |
| B. OCCOQUAN PUMPING STATION | | | | | | | | | |
| 1. STATION | 19.2(8) | 2,887 | 22.0(9) | 184 | 26.8(10) | 218 | 85.9(11) | 578 | 3,867 |
| 2. FORCE MAIN | 19.2(8) | 1,867 | 48.8(10) | 1.867 | | | 85.9(11) | 2.582 | 6.316 |
| 3. DIVERSION CONDUIT | 50(12) | 3,970 | | | | | | | 3.970 |
| PUMPING STATIONS AND FORCE MAINS | | | | | | | | | |
| BULL RUN SYSTEM | | | | | 7.6(11) | 1,750 | | | 1,750 |
| CEDAR RUN SYSTEM | | | | | 8.8(11) | 1.660 | | | 1.660 |
| YORKSHIRE SYSTEM | 3.8(10,11) | 510 | | | | | 8:6(11) | 30 | 540 |
| TOTAL | | 73,743 | | ·68,667 | | 36.880 | | 52.620 | 231.910 |

1. ACTIVATED SLUDGE WITH PHOSPHATE REMOVAL.
2. ACTIVATED SLUDGE WITH PHOSPHATE AND NITROGEN REMOVAL..
3. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 1975.
4. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 1985.
5. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 2000.
6. INCREMENTAL PLANT CAPACITY AVAILABLE FOR 1980 TO 1985
7. DESIGN CAPACITY.
8. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1975.
9. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1980.
10. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1985.
11. INCREMENTAL PUMPING CAPACTTY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 2000.
12. DESIGN CAPACITY ADEQUATE UNTIL 1980.

* These items actually include funds for a raw waste export system for Fauquier & Fairfax Counties to get their waste to the treatment Plant in the Manassas Area.

# Table IV. B

FAIRFAX COUNTY

SEWAGE TREATMENT PLANT PERFORMANCE

| PERIOD | 1970-75(1) | 1980-2000(2) |
|---|---|---|
| REMOVED | | |
| PERCENT BOD | 90 | 98 |
| PERCENT COD | 80 | 95 |
| PERCENT P. | 85 | 90 |
| PERCENT N. | 25 | 90 |

| | PHASE 1<br>1970 | | PHASE 2<br>1975 | | PHASE 3<br>1980 | | PHASE 4<br>1985 | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | COST IN $1,000 |
| | | | | | | | | | (30.5 MGD) |
| MANASSAS PLANT | 4.8(3) | 4,247 | 8.4(4) | 12,377 | | | 17.3(5) | 13,372 | 29,996 |
| OCCOQUAN PLANT | | | | | | | | | |
| INTERCEPTOR SYSTEMS | | | | | | | | | |
| FLAT BRANCH SYSTEM | | | | | | | | | |
| CUB RUN SYSTEM | 65(7) | 17,405* | | | | | | | *17,405 |
| LOUDOUN COUNTY SYSTEM | | | | | | | | | |
| BULL RUN SYSTEM | 65(7) | 1,248 | | | | | | | 1,248 |
| CEDAR RUN SYSTEM | | | | | | | | | |
| YORKSHIRE SYSTEM | 0.2(7) | 109 | | | | | | | 109 |
| EFFLUENT TRANSFER SYSTEM | | | | | | | | | $13.1? |
| A. MANASSAS PUMPING STATION | | | | | | | | | |
| 1. STATION | 8.2(8) | 1,101 | 7.3(9) | 65 | 7.3(10) | 68 | 29.9(11) | 205 | 1,439 |
| 2. FORCE MAIN | 8.2(8) | 2,170 | 14.5(10) | 1,513 | | | 29.9(11) | 2,324 | 6,007 |
| 3. GRAVITY SEWER | 45(7) | 1,023 | | | | | | | 1,023 |
| B. OCCOQUAN PUMPING STATION | | | | | | | | | |
| 1. STATION | 8.2(8) | 1,023 | 7.3(9) | 61 | 7.3(10) | 58 | 29.9(11) | 202 | 1,344 |
| 2. FORCE MAIN | 8.2(8) | 803 | 14.5(10) | 560 | | | 29.9(11) | 852 | 2,215 |
| 3. DIVERSION CONDUIT | 12(12) | 1,072 | | | | | | | 1,072 |
| PUMPING STATIONS AND FORCE MAINS | | | | | | | | | |
| BULL RUN SYSTEM | | | | | | | | | |
| CEDAR RUN SYSTEM | | | | | | | | | |
| YORKSHIRE SYSTEM | 0.3(11) | 279 | | | | | | | 279 |
| TOTAL | | 30,480 | | 14,576 | | 126 | | 16,955 | 62,137 |

1. ACTIVATED SLUDGE WITH PHOSPHATE REMOVAL.
2. ACTIVATED SLUDGE WITH PHOSPHATE AND NITROGEN REMOVAL..
3. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 1975.
4. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 1985.
5. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 2000.
6. INCREMENTAL PLANT CAPACITY AVAILABLE FOR 1980 TO 1985
7. DESIGN CAPACITY.
8. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1975.
9. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1980.
10. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1985.
11. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 2000.
12. DESIGN CAPACITY ADEQUATE UNTIL 1980.

* This item actually includes funds for a raw waste export system for Fairfax County to get their waste to the treatment Plant in the Manassas Area.

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# Table IV.C

LOUDOUN COUNTY

| | PHASE 1 1970 | | PHASE 2 1975 | | PHASE 3 1980 | | PHASE 4 1985 | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | COST IN $1,000 |
| SEWAGE TREATMENT PLANT PERFORMANCE | | | | | | | | | |
| PERIOD 1970-75(1) 1980-2000(2) | | | | | | | | | |
| REMOVED | | | | | | | | | |
| PERCENT BOD 90 98 | | | | | | | | | |
| PERCENT COD 80 95 | | | | | | | | | |
| PERCENT P. 85 90 | | | | | | | | | |
| PERCENT N. 25 90 | | | | | | | | | (3.7MGD) |
| MANASSAS PLANT | 0 | 97 | 0.9(4) | 1,211 | | | 2.8(5) | 2,282 | 3,590 |
| OCCOQUAN PLANT | | | | | | | | | |
| INTERCEPTOR SYSTEMS | | | | | | | | | |
| FLAT BRANCH SYSTEM | | | | | | | | | |
| CUB RUN SYSTEM | 17(7) | 4,105 | | | | | | | 4,105 |
| LOUDOUN COUNTY SYSTEM | | | 17(7) | 2,780 | | | | | 2,780 |
| BULL RUN SYSTEM | 17(7) | 264 | | | | | | | 264 |
| CEDAR RUN SYSTEM | | | | | | | | | |
| YORKSHIRE SYSTEM | | | | | | | | | $1.4M |
| EFFLUENT TRANSFER SYSTEM | | | | | | | | | |
| A. MANASSAS PUMPING STATION | | | | | | | | | |
| 1. STATION | 0 | 118 | 1.0(9) | 10 | 0.5(10) | 5 | 4.8(11) | 34 | 167 |
| 2. FORCE MAIN | | | 1.6(10) | 164 | | | 4.8(11) | 340 | 504 |
| 3. GRAVITY SEWER | 9(7) | 204 | | | | | | | 204 |
| B. OCCOQUAN PUMPING STATION | | | | | | | | | |
| 1. STATION | 0 | 109 | 1.0(9) | 9 | 0.5(10) | 6 | 4.8(11) | 35 | 159 |
| 2. FORCE MAIN | | | 1.6(10) | 56 | | | 4.8(11) | 129 | 185 |
| 3. DIVERSION CONDUIT | 2(12) | 198 | | | | | | | 198 |
| PUMPING STATIONS AND FORCE MAINS | | | | | | | | | |
| BULL RUN SYSTEM | | | | | | | | | |
| CEDAR RUN SYSTEM | | | | | | | | | |
| YORKSHIRE SYSTEM | | | | | | | | | |
| TOTAL | | 5,095 | | 4,230 | | 11 | | 2,820 | 12,156 |

1. ACTIVATED SLUDGE WITH PHOSPHATE REMOVAL.
2. ACTIVATED SLUDGE WITH PHOSPHATE AND NITROGEN REMOVAL..
3. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 1975.
4. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 1985.
5. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 2000.
6. INCREMENTAL PLANT CAPACITY AVAILABLE FOR 1980 TO 1985
7. DESIGN CAPACITY.
8. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1975.
9. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1980.
10. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1985.
11. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 2000.
12. DESIGN CAPACITY ADEQUATE UNTIL 1980.

# Table IV.D

PRINCE WILLIAM COUNTY

SEWAGE TREATMENT PLANT PERFORMANCE

| PERIOD | 1970-75(1) | 1980-2000(2) |
|---|---|---|
| REMOVED | | |
| PERCENT BOD | 90 | 98 |
| PERCENT COD | 80 | 95 |
| PERCENT P. | 85 | 90 |
| PERCENT N. | 25 | 90 |

(41.7 MGD)

| | PHASE 1 1970 | | PHASE 2 1975 | | PHASE 3 1980 | | PHASE 4 1985 | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | COST IN $1,000 |
| MANASSAS PLANT | 4.2(3) | 3,928 | 11.3(4) | 16,617 | | | 15.9(5) | 12,392 | 32,937 |
| OCCOQUAN PLANT | 2.0(3) | 2,930 | 3.0(4) | 9.686 | | | 5.3(5) | 4,599 | 17,217 |
| INTERCEPTOR SYSTEMS | | | | | | | | | |
| FLAT BRANCH SYSTEM | 25(7) | 3,660 | | | | | | | 3,660 |
| CUB RUN SYSTEM | | | | | | | | | |
| LOUDOUN COUNTY SYSTEM | | | | | | | | | |
| BULL RUN SYSTEM | 81(7) | 1,701 | 56(7) | 10,084 | | | | | 11,785 |
| CEDAR RUN SYSTEM | 32(7) | 4,036 | 13(7) | 1,306 | | | | | 5,342 |
| YORKSHIRE SYSTEM | 8.8(7) | 4,511 | | | | | | | 4,511 |
| EFFLUENT TRANSFER SYSTEM | | | | | | | | | |
| A. MANASSAS PUMPING STATION | | | | | | | | | $ ~16? |
| 1. STATION | 7.3(8) | 1,091 | 11.1(9) | 102 | 9.5(10) | 77 | 27.5(11) | 192 | 1,462 |
| 2. FORCE MAIN | 7.3(8) | 1,924 | 19.5(10) | 2,046 | | | 27.5(11) | 2,382 | 6,352 |
| 3. GRAVITY SEWER | 71(7) | 1,343 | | | | | | | 1,343 |
| B. OCCOQUAN PUMPING STATION | | | | | | | | | |
| 1. STATION | 11.0(8) | 1,345 | 13.7(9) | 114 | 11.0(10) | 90 | 36.7(11) | 243 | 1,792 |
| 2. FORCE MAIN | 11.0(8) | 1,065 | 24.7(10) | 934 | | | 36.7(11) | 1,163 | 3,162 |
| 3. DIVERSION CONDUIT | 25(12) | 1,868 | | | | | | | 1,868 |
| PUMPING STATIONS AND FORCE MAINS | | | | | | | | | |
| BULL RUN SYSTEM | | | | | | | | | |
| CEDAR RUN SYSTEM | | | | | | | | | |
| YORKSHIRE SYSTEM | 3.5(10) | 231 | | | | | 8.8(11) | 30 | 261 |
| TOTAL | | 29,633 | | 40,891 | | 167 | | 21,001 | 91,692 |

1. ACTIVATED SLUDGE WITH PHOSPHATE REMOVAL.
2. ACTIVATED SLUDGE WITH PHOSPHATE AND NITROGEN REMOVAL..
3. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 1975.
4. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 1985.
5. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 2000.
6. INCREMENTAL PLANT CAPACITY AVAILABLE FOR 1980 TO 1985
7. DESIGN CAPACITY.
8. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1975.
9. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1980.
10. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1985.
11. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 2000.
12. DESIGN CAPACITY ADEQUATE UNTIL 1980.

# Table IV.E

FAUQUIER COUNTY

| SEWAGE TREATMENT PLANT PERFORMANCE | | |
|---|---|---|
| PERIOD | 1970-75(1) | 1980-2000(2) |
| REMOVED | | |
| PERCENT BOD | 90 | 98 |
| PERCENT COD | 80 | 95 |
| PERCENT P. | 85 | 90 |
| PERCENT N. | 25 | 90 |

| | PHASE 1 1970 | | PHASE 2 1975 | | PHASE 3 1980 | | PHASE 4 1985 | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | FLOW, mgd | COST IN $1,000 | COST IN $1,000 |
| | | | | | | | | | (13MGD) |
| MANASSAS PLANT | 0 | 176 | 2.1(6) | 1,667 | | | 4.1(5) | 4,554 | 6,397 |
| OCCOQUAN PLANT | 0 | 415 | 2.5(6) | 297 | | | 4.3(5) | 6,081 | 6,793 |
| INTERCEPTOR SYSTEMS | | | | | | | | | |
| FLAT BRANCH SYSTEM | | | | | | | | | |
| CUB RUN SYSTEM | | | | | | | | | |
| LOUDOUN COUNTY SYSTEM | | | | | | | | | |
| BULL RUN SYSTEM | 31(7) | 567 | 31(7) | 4,966 | 31(7) | 11,780 | | * 2 | 17,313 |
| CEDAR RUN SYSTEM | 45(7) | 5,574 | 45(7) | 1,354 | 45(7) | 21,290 | | | 28,218 |
| YORKSHIRE SYSTEM | | | | | | | | | |
| EFFLUENT TRANSFER SYSTEM | | | | | | | | | |
| A. MANASSAS PUMPING STATION | | | | | | | | | ~$3.8 |
| 1. STATION | 0 | 213 | | | 3.6(10) | 33 | 7.1(11) | 48 | 294 |
| 2. FORCE MAIN | | | 3.6(10) | 369 | | | 7.1(11) | 624 | 993 |
| 3. GRAVITY SEWER | 15(7) | 350 | | | | | | | 350 |
| B. OCCOQUAN PUMPING STATION | | | | | | | | | |
| 1. STATION | 0 | 408 | | | 8.0(10) | 63 | 14.5(11) | 98 | 569 |
| 2. FORCE MAIN | | | 8.0(10) | 317 | | | 14.5(11) | 439 | 756 |
| 3. DIVERSION CONDUIT | 11(12) | 832 | | | | | | | 832 |
| PUMPING STATIONS AND FORCE MAINS | | | | | | | | | |
| BULL RUN SYSTEM | | | | | 7.6(11) | 1,750 | | ~$3.4* | 1,750 |
| CEDAR RUN SYSTEM | | | | | 8.8 | 1,660 | | | 1,660 |
| YORKSHIRE SYSTEM | | | | | | | | | |
| TOTAL | | 8,535 | | 8,970 | | 36,576 | | 11,844 | 69,925 |

1. ACTIVATED SLUDGE WITH PHOSPHATE REMOVAL.
2. ACTIVATED SLUDGE WITH PHOSPHATE AND NITROGEN REMOVAL..
3. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 1975.
4. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 1985.
5. INCREMENTAL PLANT CAPACITY ADEQUATE UNTIL 2000.
6. INCREMENTAL PLANT CAPACITY AVAILABLE FOR 1980 TO 1985
7. DESIGN CAPACITY.
8. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1975.
9. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1980.
10. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 1985.
11. INCREMENTAL PUMPING CAPACITY INCLUDING RESERVE CAPACITY ADEQUATE UNTIL 2000.
12. DESIGN CAPACITY ADEQUATE UNTIL 1980.

* This item actually includes funds for a raw waste export system for Fauquier County to get their waste to the treatment plant in the Manassas Area.

# V.

## "Tahoe East" for the Occoquan: Clean-Up for Recycle Solution

a. What Would Such a Plant Look Like

- (1) General Discussion of Requirements
- (2) One Line System Diagram ________ Figure V. A. 1
- (3) A More Detailed Diagram Covering Reliability Features Required in Such a Plant _________ Figure V. A. 2
- (4) Minimum Effluent Quality Requirements for Such a Plant Table V. A. 1

b. What Would This Type of Plant Do to the Occoquan Reservoir Water Quality?

- (1) Water Quality Now
- (2) With a 10 MGD - High Performance Plant
- (3) With a 40 MGD - High Performance Plant

c. (1) What Would it Cost?

- (2) What are Overall Conclusions?

d. Administrative Requirements for Controlling the Use of Such a Plant on a Water Supply

"Important Background on this Section" –
See the Introduction Section of
this Report

## V.A

## WHAT WOULD A TAHOE TYPE PLANT LOOK LIKE FOR THE OCCOQUAN RESERVOIR

## V. A

## GENERAL DISCUSSION OF PLANT DESIGN REQUIREMENTS

### I. Background

I believe that the following statement is a fair summary of how sewage plants have been designed in the past:

> "The traditional approach to sewage treatment is to design and construct the minimal facility that hopefully will just avoid a public outcry when the effluent is diluted in the nearest river, lake, or estuary."

Dr. Warren J. Kaufman, Professor
Sanitary Engineering
University of California

From my own observations of plant designs, I have come to the same conclusion since all too often the plants are little more than an excuse to run a pipeline to the river or lake. The real tragedy of this situation is that this need not be the case in this day and time; but somehow modern techniques and approaches to design and reliability used throughout other industries and technologies in our country have by-passed the sewage plant design industry.

### II. Introduction

There is no reason why sewage treatment plants cannot be built with the highest degree of reliability and performance with the modern technologies that are available. A treatment plant on a water supply, such as the Occoquan Reservoir, must be designed on such a basis. If this is done, it will do two things for our environment: (1) truly solve the pollution problems created by sewage, and (2) purify such wastes to very high levels and thereby develop a new water supply resource.

The design of the high performance sewage treatment plants for the Occoquan Reservoir, or any other drinking water reservoir, shall meet all the requirements specified herein as well as those specified in the very minimal sewage industry standards (e.g., the Ten State Standards) and the FWQA Design, Operation and Maintenance Guidelines of September 1970.

Changes to the plant design described herein shall only be acceptable if the change does all of the following:

A. Improves or equals the plant performance and final effluent quality

B. Increases plant reliability and maintainability

C. Has a demonstrated performance in plant of at least 5 to 10 MGD size for an operating period of one or two years.

Changes to the plant design solely to reduce cost and which jeopardize plant performance and reliability should be looked upon with extreme disfavor.

## III. Basic Choice of Plant Design Concept for the Occoquan

The basic sewage plant design concept for the initial phase of the plant on the Occoquan Reservoir shall be based on the Lake Tahoe Plant as described herein (i. e., an activated sludge plant which is followed by a physical-chemical treatment system). The reason for choosing this concept is as follows:

> Since this large plant is designed to discharge directly into a water supply reservoir and will be a precedent-setting undertaking, the design must therefore be restricted to Advanced Waste Treatment concepts with a demonstrated high performance over a period of at least two years and in a plant with a design capacity of 5 MGD or more. To utilize many of the newly developing advanced waste treatment concepts that do not have a demonstrated high performance in a large scale plant would be unwise and imprudent for this particular application at this time. For future increments, when the plant is expanded, additional concepts can be considered (e. g., a completely physical-chemical system) when a demonstrated performance in meeting the standards set in Table V.A.1 can be shown. Small scale pilot plants (i. e., less than 5 MGD design capacity) and paper study plants shall not be considered for this type of application due to insufficient demonstration of performance.

It should be noted that the basic design concept chosen and the special design requirements specified herein (e. g., secondary clarifiers shall be designed as chemical clarifiers) have been included so that in the event that some chemical and/or conditions should kill the bug-culture in the areation basins, the final plant effluent should not be affected.

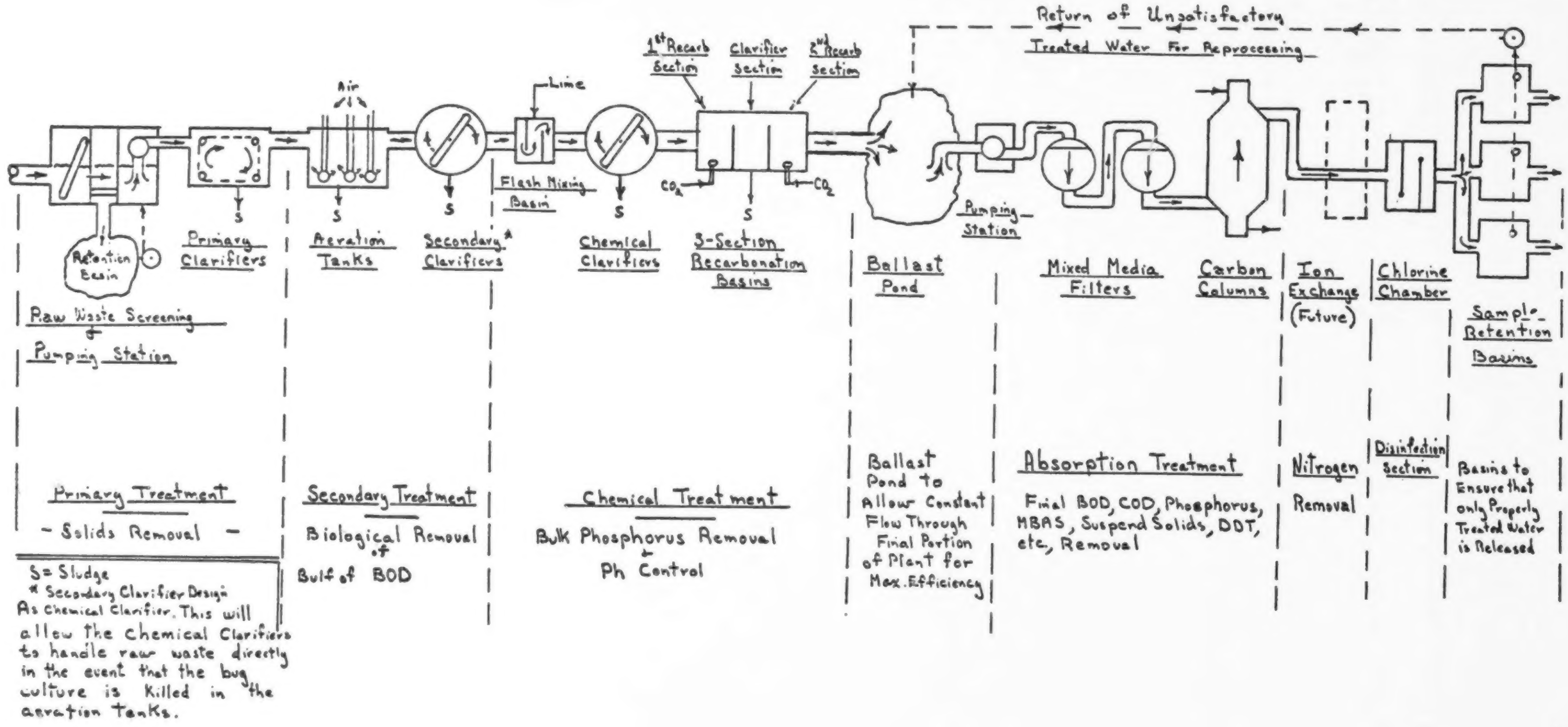
In summary, this plant should be designed with the philosophy that "there shall be zero release of inadequately treated water."

## IV. Detailed Plant Design

The detailed plant design requirements are shown on Figures V.A.1 and V.A.2 and their associated notes. The plant performance requirements are given in Table V.A.1.

# Figure V.A.1

## High Performance & Maximum Reliability Treatment Plant*


Return of Unsatisfactory
Treated Water For Reprocessing
Air
Lime
1st Recarb Section
Clarifier Section
2nd Recarb Section
Flash Mixing Basin
CO2
CO2
S
S
S
S
S
S
Retention Basin
Primary Clarifiers
Aeration Tanks
Secondary Clarifiers*
Chemical Clarifiers
3-Section Recarbonation Basins
Ballast Pond
Pumping Station
Mixed Media Filters
Carbon Columns
Ion Exchange (Future)
Chlorine Chamber
Sample Retention Basins
Raw Waste Screening & Pumping Station
Primary Treatment
- Solids Removal -
Secondary Treatment
Biological Removal of Bulf of BOD
Chemical Treatment
Bulk Phosphorus Removal & Ph Control
Ballast Pond to Allow Constant Flow Through Final Portion of Plant for Max. Efficiency
Absorption Treatment
Final BOD, COD, Phosphorus, MBAS, Suspend Solids, DDT, etc, Removal
Nitrogen Removal
Disinfection Section
Basins to Ensure that only Properly Treated Water is Released

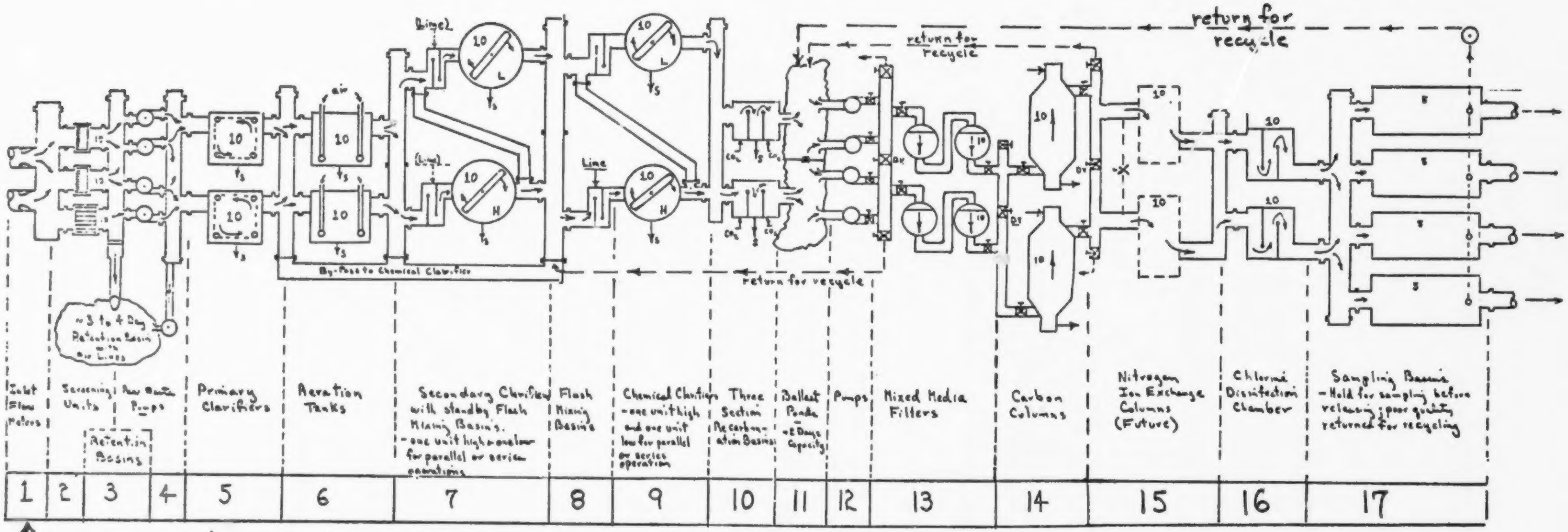
S= Sludge
* Secondary Clarifier Design As Chemical Clarifier. This will allow the chemical Clarifiers to handle raw waste directly in the event that the bug culture is Killed in the aeration tanks.

* For Use in Areas Where Drinking Water Supply is involved and other Critical Situations

11/12/70

Figure V.A.2

—Detailed System Diagram—
Indicating the Features
Incorporated into the Plant to Give It the Highest Reliability*


Lime
Lime
air
return for recycle
return for recycle
return for recycle
By-Pass to Chemical Clarifier
~3 to 4 Day Retention Basin with Air Lines
Inlet Flow Meters
Screening Units
Raw Waste Pumps
Retention Basins
Primary Clarifiers
Aeration Tanks
Secondary Clarifiers with standby Flash Mixing Basins. - one unit high & one low for parallel or series operations
Flash Mixing Basins
Chemical Clarifiers - one unit high and one unit low for parallel or series operation
Three Section Recarbonation Basins
Ballast Ponds ~2 Days Capacity
Pumps
Mixed Media Filters
Carbon Columns
Nitrogen Ion Exchange Columns (Future)
Chlorine Disinfection Chamber
Sampling Basins - Hold for sampling before releasing; poor quality returned for recycling
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17

See section II of the Notes on this diagram for discussion on each item (see next page)

*Designed with the Philosophy "There shall be ZERO release of inadequately treated water."

# NOTES FOR DETAILED SCHEMATIC DIAGRAM

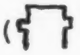
(Figure V. A. 2)

## I. General Notes on Diagram

A. The 10 MGD rating was chosen for illustrative purposes and not as the specific rating of the plant.

B. The initial spare or stand-by capacity within the plant shall be 100% for the initial increment of the plant. After the initial few years of operations, the plant's reliability should be better established and it is hoped that three future additional treatment trains can be added for a rated capacity of 40 MGD plus one stand-by 10 MGD treatment train. Thus eventually giving a 4 to 1 ratio of on the line units to spares.

C. The number "10" shown on the various units in the diagram are to show the average rate flow capacity of that unit. However, it should not be interpreted to imply that a "unit" must be made up of just one component. For example, several carbon columns may be required to handle 10 MGD.

D. The design shall be such that expansion can be accomplished without by-passingwaste or degrading treatment. The symbol (  ) used on the diagram indicates most likely location of gates for flexibility in operation, to permit repair and maintenance of equipment, and to permit future expansion.

E. There shall be two independent sources of outside power and one "on-site" power supply. Both the "off-site" and "on-site" electrical distribution systems shall be such that the failure of any one given component (mechanical or electrical) will not cause an interruption of electrical service to the plant.

II. Detailed Plant Design Requirements (See number specified below each unit on diagram)

1. Flow measuring devices shall be located near first portion of plant. Other such flow meters are to be added as detailed design indicates.

2. Screening Units shall consist of:

   a. Two electro-mechanical units

   b. One manual unit to screen waste going to retention basin in the event of total power failure.

3. Retention Basins shall be provided:

   a. To handle an unpredictable set of events which might overload plant and provide a safety margin in the event of operator error.

   b. Provisions for nominal aeration should be included to keep waste from going septic.

4. Raw Waste Pumping shall include:

   Two sets of pumps. Each set shall be capable of handling full plant average flow as well as its associated peak flow.

5. Primary Clarifiers

There shall be two units, each capable of handling the full plant average flow and its associated peak flow. These clarifiers shall be designed so they can be used or readily modified to function as chemical clarifiers.

6. Aeration Tanks

There shall be two units each capable of handling the full plant average flow and its associated peak flow.

7. Secondary Clarifiers

a. There shall be two units, each capable of handling the full plant average flow and its associated peak flow.

b. These secondary clarifiers are to be designed as chemical clarifiers (i. e., designed to handle the heavier lime sludge). These clarifiers are to include stand-by flash mixing basins. Thus, these clarifieres can be used as chemical clarifiers in the event that the activated seed culture is killed. As such the chemical clarifiers shall be capable of handling raw waste water directly and still maintain the required water quality effluent.

c. The sludge return line and pumps from these clarifiers shall be arranged with the capability that the sludge from one clarifier can be returned to the aeration tank and the sludge from other clarifier sent directly to sludge handling facilities without having the sludge from the two clarifiers intermixed. This is to allow chemicals to be used in the lower secondary clarifier and not interfere with activiate sludge being returned from high clarifier to the aeration tanks.

8. Flash Mixing Basin

For injecting and mixing lime in secondary treated effluent.

9. Chemical Clarifiers

There shall be two units each capable of handling the full plant average flow and its associated peak flow.

10. Three Section Recarbonation Basin

The first and third sections are where $CO_2$ is injected into the waste for lowering the ph to the ~7.5. The second section is used as a final clarifier for removal of chemicals.

11. Ballast Ponds

This is to allow the flow rate through the final stage of the plant to be operated at a constant flow rate for maximum efficiency. The ponds in essence smooth out the sewage flow rate which varies greatly over a 24 hour period.

12. Pumping Station

Provides the necessary driving head for pushing the partially treated waste through final portions of the plants; also provisions shall be included which will allow returning inadequately treated waste for recycling through the chemical clarifier.

13. Mixed Media Filters and Carbon Columns

Experience at Tahoe has shown that it is most important waste water flow up through the carbon solumns and that new activated carbon be introduced at the top and drawn off at the bottom. This plant shall have the same features.

14. Nitrogen Removal Equipment (Future)

Best guess for the most reliable and all weather system is an ion exchange method which is still in the early development stage. Clinoptilolite ion exchanges should be considered for the initial plant.

15. Chlorine Disinfectant Chambers

16. Sampling Basins

The actual size of these basins shall be established by detailed design and the time required for sampling and determining the actual quality of the treated water before release of water. The treated effluent not meeting the minimum required effluent quality specified in Table V. A. 1 shall be required to the ballast pond for recycling.

III. Other General Design Requirements

A. The sludge processing system shall be designed so that only colorless and odorless gases shall be discharged to the atmosphere.

## TABLE V.A.1

## MINIMUM EFFLUENT QUALITY REQUIREMENTS* FOR SUCH A PLANT ON THE OCCOQUAN RESERVOIR

| | BOD<br>Mg/L | COD<br>Mg/L | Suspend Solids<br>Mg/L | Nitrogen<br>Mg/L | Phosphorous<br>Mg/L | MBAS<br>Mg/L | Turbidity<br>Jax Units | Coliform per 100 ML Sample |
|---|---|---|---|---|---|---|---|---|
| Final Effluent Requirements | 1 | 7 | 0** | 15*** | .1 | .1 | .4 | Less than 2 |
| Typical Percent Removals (These are for information only - not requirements) | ~99.5% | ~99.0% | 100% | 50% | ~99.5% | ~99% | ~100% | ~100% |

* As measured on a weekly average. Since these are minimum requirements, the normal average would be expected to be substantially better.

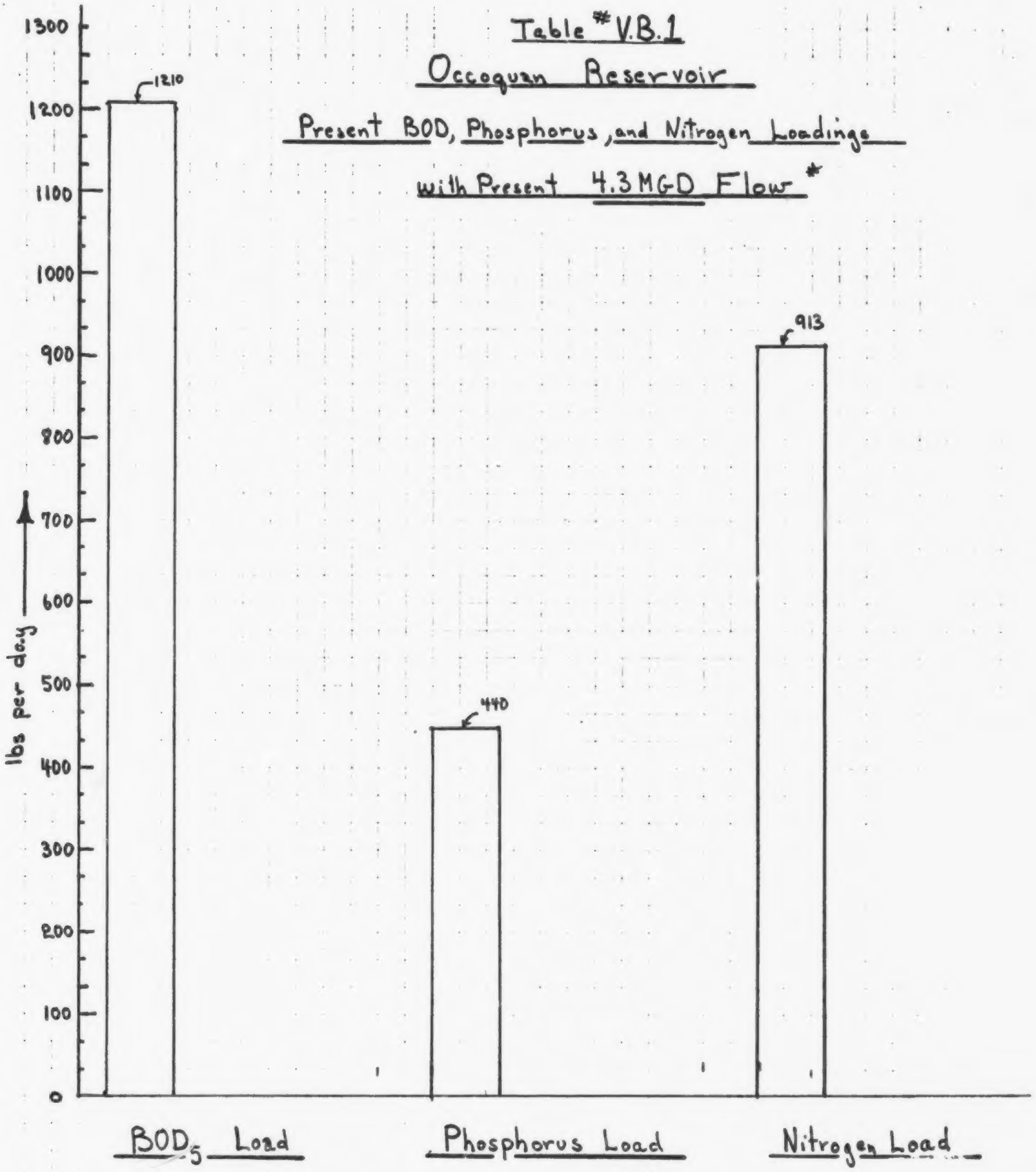
** Unmeasurable.

*** A more desirable limit for nitrogen would be ~3Mg/L, if a satisfactory year-round nitrogen removal unit were available. Accordingly, in the detailed design of the initial plant, the designer should consider incorporating chemical means to achieve this lower limit, if FWQA research work develops a proven, reliable all-weather unit.

## V. B

## WHAT WOULD A TAHOE TYPE PLANT DO TO THE OCCOQUAN RESERVOIR

## Table #V.B.1
## Occoquan Reservoir
## Present BOD, Phosphorus, and Nitrogen Loadings with Present 4.3 MGD Flow*



* See Table III.A, Line #12.

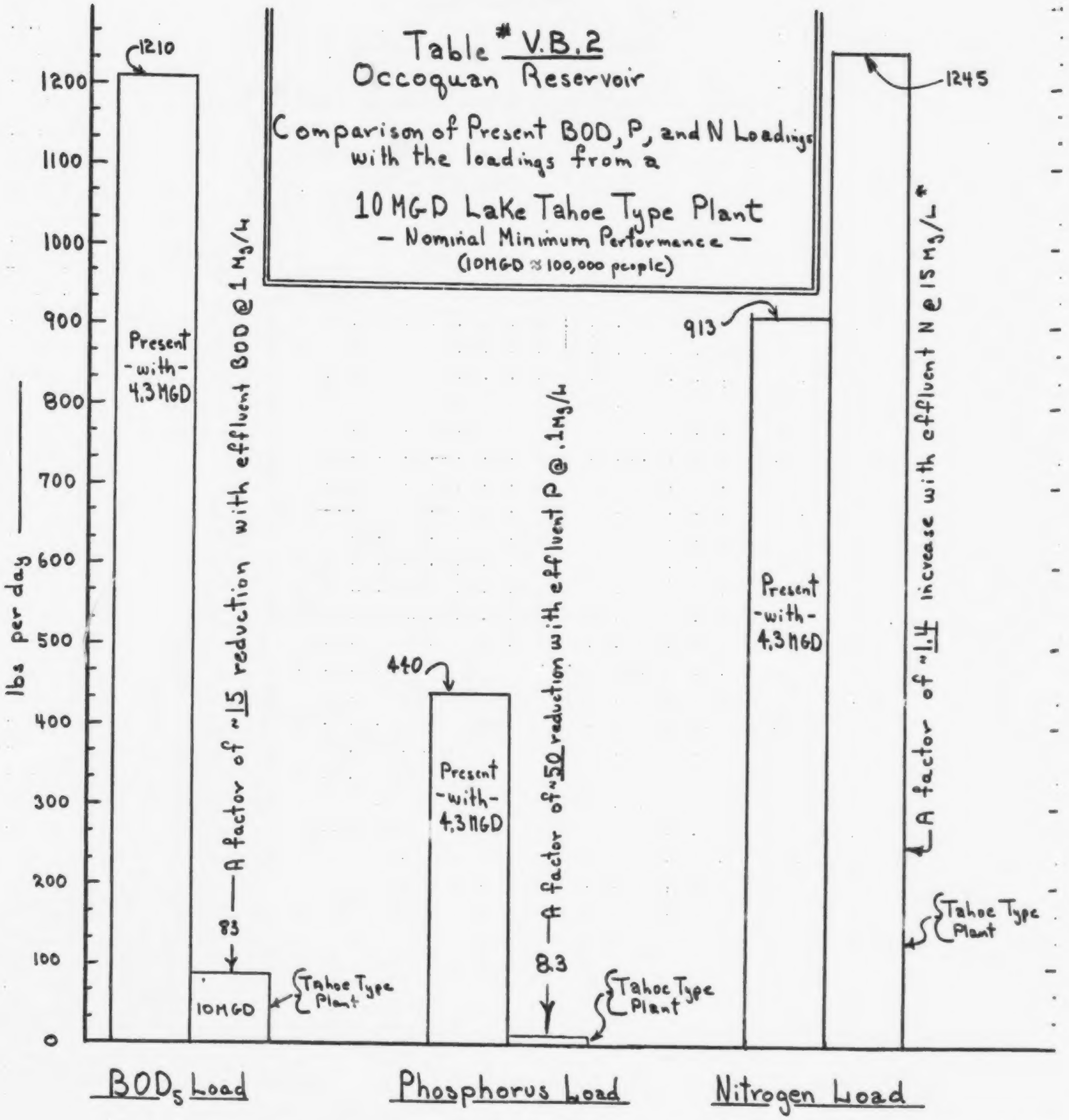


Table # V.B.2
Occoquan Reservoir

Comparison of Present BOD, P, and N Loadings with the loadings from a

10 MGD Lake Tahoe Type Plant
— Nominal Minimum Performance —
(10 MGD ≈ 100,000 people)

* This could possibly be reduced to 3 mg/l or 250 lb/day; See Table # 5B.4

5b.2

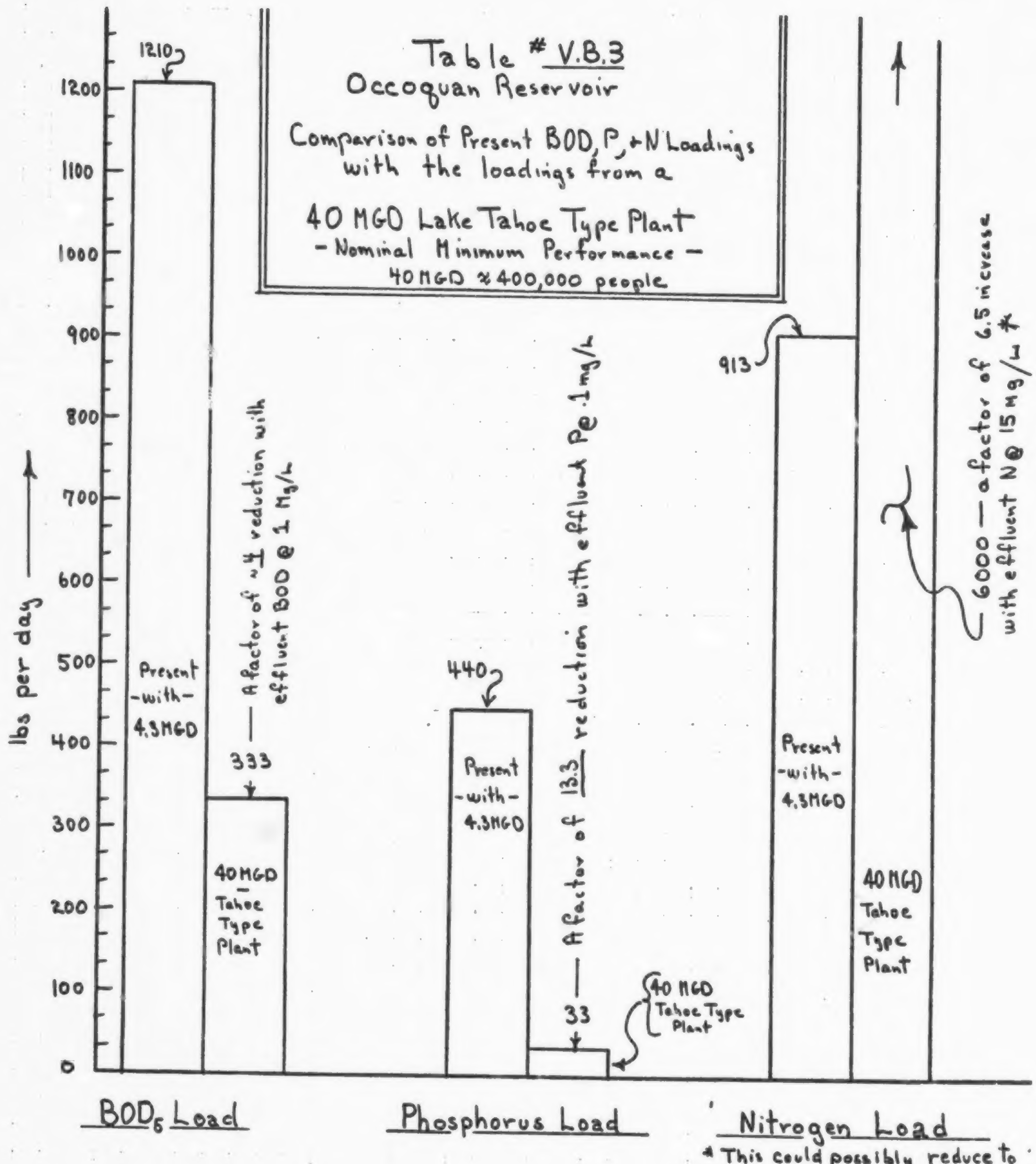


Table # V.B.3
Occoquan Reservoir

Comparison of Present BOD, P, + N Loadings with the loadings from a

40 MGD Lake Tahoe Type Plant
- Nominal Minimum Performance -
40 MGD ≈ 400,000 people

* This could possibly reduce to or 1200 lb/day; See Table # 5B.5

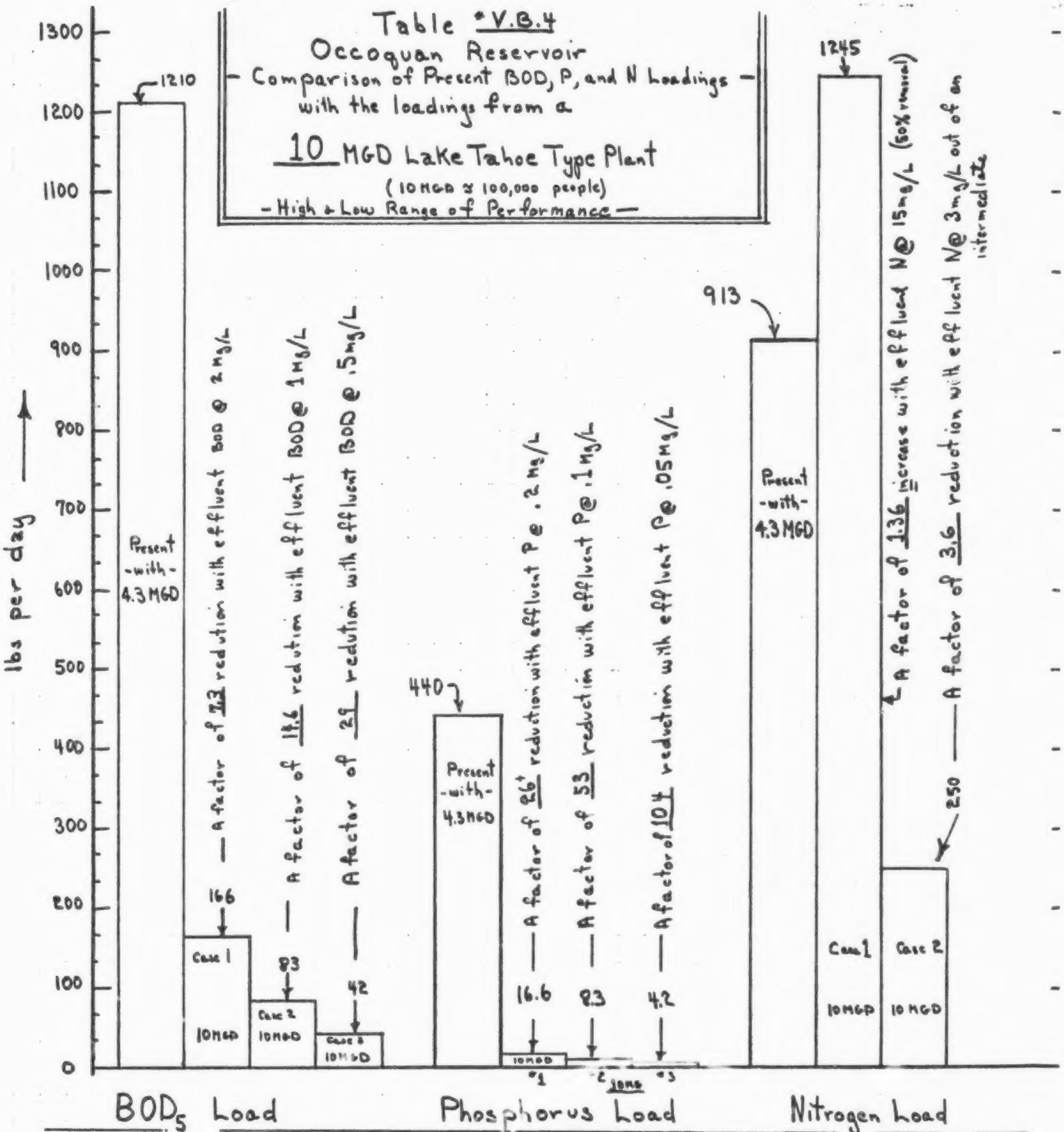


Table *V.B.4
Occoquan Reservoir
– Comparison of Present BOD, P, and N Loadings –
with the loadings from a
10 MGD Lake Tahoe Type Plant
(10 MGD ≈ 100,000 people)
– High & Low Range of Performance –

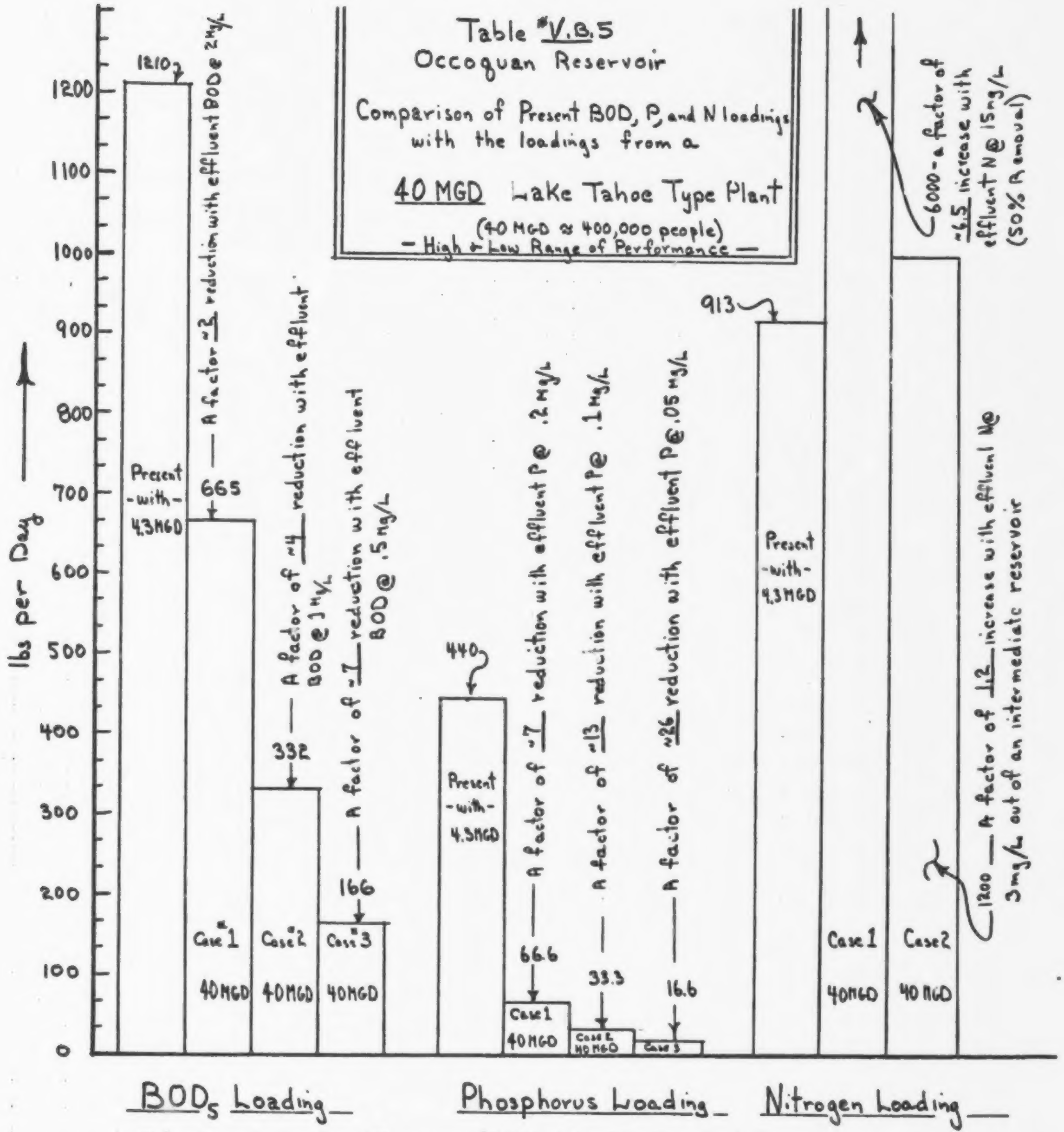
Note: Cases 1, 2, 3 – all assume 10 MGD Lake Tahoe Type Plant. The difference among cases, is the assumed Treatment efficiency.

Table #V.B.5
Occoquan Reservoir

Comparison of Present BOD, P, and N loadings with the loadings from a

40 MGD Lake Tahoe Type Plant

(40 MGD ≈ 400,000 people)
– High & Low Range of Performance –



Note: Case 1, 2, & 3 – all assume 40 MGD Lake Tahoe Type Plant. The difference among cases is the assumed Treatment Efficiency

5b.5

## V.C

## COST AND OVERALL CONCLUSIONS

## TABLE V.C.1

## COST COMPARISON(A)

EXPORT APPROACH (M&E PROPOSAL) - versus - HIGH LEVELS OF TREATMENT APPROACH

| | Time Period → | 1970 to 1975 | | 1975 to 1985 | |
|---|---|---|---|---|---|
| | | Metcalf and Eddy Proposal | High Performance and Maximum Reliability<br>Lake Tahoe Type Plant | Metcalf and Eddy Proposal | High Performance and Maximum Reliability<br>Lake Tahoe Type Plant |
| 1 | Plant Capacity -MGD- | 11 MGD | | 29 MGD (11 + 29 = 40) | |
| 2 | Plant Cost | $11.8 | $16 to 18 | $29 (D) | $29 (D) |
| 3 | Exporting System Cost (B) | $18.3 (B) | None | $6.3 (B) | None |
| 4 | Total Cost of Plant and Export | $30.1 (B) | $18 | $35.3 (B) | $29 |

| | Time Period → | 1970 to 1985 | |
|---|---|---|---|
| | | Metcalf and Eddy Proposal | High Performance and Maximum Reliability<br>Lake Tahoe Type Plant |
| 1 | Plant Capacity | 40 MGD | |
| 2 | Plant Cost | $40.8 | $47.0 |
| 3 | Export System Cost | $24.6 (B) | None |
| 4 | Total Cost of Plant and Export System | $65.4 (B) | $47.0 |
| 5 | Cost Difference (Saving) to Treat Rather than Export | | ~$20 million |

Note:
1. All cost in millions.
2. For other notes see next page.

TABLE #V.C.1 (Cont'd
Cost Comparison)

NOTES:

A. All cost in millions of dollars.

B. Does not include the cost associated with the Bull Run or the Cedar Run interceptors whose upper portions are really export systems for Warrenton and Fauquier County area.

C. The high performance plant of 40 MGD would consist of four 10 MGD process systems, plus one other 10 MGD process system in "stand-by reserve." Accordingly, the first 10 MGD process system installed would also include the 10 MGD "back-up system" and therefore, would be the most expensive phase of construction program for this type of plant. Thus, the remaining three 10 MGD systems needed to make up a 40 MGD plant would be less costly than the first 10 MGD system. We hope to get to the 4 to 1 split as we prove the plants reliability and performance. Therefore, initial units should start-up with a 1 to 1 split between line units and stand-by units.

D. To put the M and E study in the best light, this plant cost figure is based on their overall plant capital cost of ~$1 millions per MGD of plant capacity for the entire project. This was done because in 1975 M and E proposed phasing some of the construction during that period which resulted in a higher than normal capital cost of ~$1.4 million per MGD of plant capacity.

## OVERALL CONCLUSIONS OF STUDY
## For Period of 1970 to 1985

1. By building such a high performance plant in the Bull Run/Club Run area to serve surrounding areas of Fairfax County, Prince William County and Manassas, The Capital Cost Saving in Just This One Portion of the Overall Project Would Be ~$20 Million.* In essence, the less expensive solution for the Occoquan situation is to clean up waste for re-use rather than the old classic solution of "export and dilute."

2. There will also be other major cost savings: For example:
   a. Fauquier County county could save $40 to $50 million by building such a high performance plant in their area; rather than requiring them to build a major pipe line/pumping system to export their waste to the Manassas area as proposed by M and E study.

   b. Elimination of the operating cost for the system to export secondary treated waste out of the Occoquan watershed (i. e., ~40 MGD export by 1985).*

   c. Further, could possible save Fairfax and Loudoun Counties a total of $10 to $17 million by eliminating the need for the Club Run Interceptor system to export raw waste to the plant in the Manassas area. This approach would involve building a high performance plant in the upper to middle part of Club Run (see item 3. c below).

3. A summary of the number of high performance plants to serve the Occoquan is as follows:

   a. One plant in the Fauquier/Warrenton area.

   b. One plant in the Manassas area to serve the surrounding area in Prince William County and possibly in Fairfax County (see Item c. below).

   c. With regard to the question of where the Fairfax and Loudoun Counties waste is to be processed, there appear to be two basic options:

      (1) Export their waste to the plant in the Manassas area for processing such as proposed by the M&E study. (Note: Line size could initially be less than 65 MG as indicated in the M&E proposal.)

      (2) Build a high performance plant in the upper to middle part of Club Run to (a) eliminate the present five small plants now in that area and (b) to serve future needs of Fairfax and Loudoun County. By treating the waste in place rather than exporting these two counties could save a combined total of $10 to $17 million on the export interceptor. Further, by not building such an interceptor system it will (a) minimize major siltation problems which will be associated with laying such an interceptor in this very difficult area and (b) also save a major

portion of the stream valley from destruction caused by such an interceptor. However, by having this smaller plant, it will result in somewhat higher capital and operating costs than if the waste were processed in one large plant in the Manassas area.

5. Hopefully, this will help kill the archaic and technically out-of-date philosophy that the "solution to the control of water pollution is export and dilution" -- or more simply and clearly stated, "Do not dump it in my yard - but it is all right to dump it in my neighbors'."

6. We would have a valuable asset (e. g., a 10 to 40 MGD clean water source between now and 1985). This clean water source will help stretch our water supply as well as protect our valuable park land investments on the Occoquan.

7. In summary, we will have preserved the Occoquan reservoir water quality as well as provide a major source of its water supply. Further, in this approach, we will have spent our efforts, energy, talent, and financial resources for "treatment of water", rather than for expensive export pipes which do not clean up any water but just move the problem elsewhere!

This approach of thoroughly cleaning up waste is equivalent to developing a new water supply resource.

(Note:* This cost figure is considered conservative particularly since recently significantly tighter standards have been set over what was used by M&E in their study. On December 8, 1970, FWQA's Chesapeake Technical Support Laboratory set the following minimum standard for discharge of effluent into tidal embayments of the Potomac River. UOD = 10 Mg/L (See Section I for definition)
Phosphorous = .2 Mg/L

Since these are practically equivalent to the requirements for direct discharge into the Occoquan Reservoir (Table 5.2.1), the capital cost for plants which export waste to the Potomac River should be in essence the same as the high performance plant. However, the high performance plant would not have to have the expensive export system for the treated waste. Further, operating cost of the plants in both cases would be about the same, except here again the high performance plant would not have the operating cost associated with exporting out 10 to 40 MGD.)

## V.D

## ADMINISTRATIVE REQUIREMENT FOR SUCH A PLANT ON A WATER SUPPLY

# V. D

# ADMINISTRATIVE REQUIREMENTS FOR CONTROLLING THE USE OF PLANTS DISCHARGING TO A WATER SUPPLY

## A. Summary of Areas Covered by Requirements

The administrative requirements that shall be placed on a "certificate owner" for such a plant will cover the following areas:

1. Requirements indicating that all the requirements placed on the plant's certificate owner shall also be placed on the users of the plant.
2. Requirements for plant staffing.
3. Requirements for information to be submitted with the preliminary and final plans and specifications.
4. Requirements for a failure mode and effects analysis report.
5. Requirements for pumping station on the collection system.
6. Requirements for flow measuring device in the collection system.
7. Requirements to prevent plant overloading.
8. Requirements to control siltation on the reservoir.
9. Requirements concerning industrial waste.
10. Requirements for independent design review of plant.

11. Requirements setting forth that existing plants are to be taken out of service and their waste processed by the new high performance plant before allowing new developments to connect to the new plant.

12. Requirements allowing the placing of additional requirements on the owner and jurisdiction if problems develop.

13. Requirements making the owner primarily responsible to see that jurisdiction meets all the SWCB requirements.

B. Details of Requirements

1. The owner to whom the certificate is issued for such a plant shall be required to meet the general and administrative requirements covered below. These requirements shall also be contractually passed on by the owner to any parties and/or jurisdiction which the owner may contract with for processing of waste water.

2. The high performance treatment plant shall be manned by an appropriate number of trained and qualified operating, maintenance, and laboratory personnel and manned continuously 24 hours a day throughout the year. The minimum number of such people manning the plant during any one given work shift shall not be less than five (5).

3. The "owner" shall include as a part of his preliminary and final plans and specifications which are submitted to the SWCB for approval a detailed statement indicating how each of the technical and administrative requirements of section V. A and V. D of this

report have been met. Any proposed deviation from any of these requirements shall be clearly identified and technically justified, and shall require formal SWCB approval. These submittals shall also include:

a. Simplified fluid system diagrams which clearly identify the following:

    (1) The average and peak capacity of each unit
    (2) The number of units of each type needed to handle the normal average flow, and the peak flow.

    (3) The number of spare units and their capacity for both average and peak flow cases shall also be identified.

    In addition, a brief narrative summary description shall be submitted to identify what has been done to ensure that each unit and major subsystem can be maintained and expanded without release of effluent that does not meet the minimum standards.

b. A simple one-line power distribution system diagram showing how outside power is brought into the plant and how power is distributed within the plant proper shall be submitted. This diagram shall also show at a minimum:

(1) Ratings and characteristics of electrical components such as transformers, circuit breakers, motor controllers, etc., making up the system.

(2) Protective devices such as thermal overloads, under frequency, or under voltage relays.

(3) Voltages supplied by all buses

(4) Normal circuit breaker and switch conditions (notes shall also be provided as required to cover abnormal, casualty and emergency operating modes)

(5) How electrical loads are combined into switch gear and load centers (the use of cubicle outlines in phantom or dotted line is suggested)

4. The final submittal of plans and specifications for the plant to the SWCB shall include a systematic failure mode and effects analysis on the mechanical and electrical portions of the plant so as to demonstrate that a single failure of a mechanical or electrical component will not interrupt the plant operations which are necessary to meet the effluent requirements of Table V. A. 1.

5. Pumping stations on the collection systems which feed into this plant shall have (a) stand-by pumping units, (b) "on-site" backup power supply, (c) dual "off-site" power supply, (d) be designed so that no single failure of a mechanical or electrical component

could degrade pumping capability, (e) pumps and valves arranged so that these units can be removed and replaced without by-passing of sewage, (f) flow measure devices with provisions for recording flow and (g) retention basins of ~one day capacity. If these pumping stations are remote and unmanned, an alarm system shall be provided at manned stations to indicate that problems are developing and to direct maintenance assistance to the affected pumping station. Each pumping station shall be required to obtain a SWCB certificate.

6. The major junctions in the collection system(e. g., at least at the 1 to 2 MGD collection points) shall have continous recording flow devices to help in the early identification of problem portions of a collection system in the event of unexplainable high flows (e. g., excessive infiltration). Also such flow measuring devices shall be provided between jurisdictions as well as any others who contract for services of this plant.

7. To ensure that the plant does not become overloaded, the owner and any others to whom the owner has contracted to supply services shall:

   a. When the average flow for any consecutive three-month period reaches 80% of the plant permit capacity, a formal public notice shall be issued by the owner and by the parties who have contracted with the owner for services that the plant is approaching its limit and that additional capacity will be needed.

b. When the average flow for any consecutive three-month period reaches 95% of the plant permit capacity, the jurisdictions using this plant shall temporarily terminate the issuance of permits which allow start of construction on projects in the affected area and submit a plant expansion program to the State Water Control Board for its review and approval before granting any additional such permits. A 5% margin should allow the projects with approved permits that allow start of construction to be completed and still not overload the plant.

In regard to the above, the entire object of this procedure is to ensure that the sewage treatment plant does not become overloaded and that a "warning system" is established to inform all concerned of the problem in time to allow planned and orderly corrective action. It is assumed that if sufficient attention is given to advance planning, design, and facility construction by the owner and jurisdictions, it is unlikely that the steps called for in item b above will ever have to be implemented.

8. A siltation ordinance shall be in effect on development and construction projects which are to be served by this plant. Such an ordinance shall require that positive physical steps be established for the control, monitoring and correction of siltation problems. Specifically, such an ordinance shall require the use of siltation basins which

have a specified silt level that is not to be exceeded without requiring the basin to be cleaned out and other corrective measures taken to correct the causes of the excessive siltation.

The reason that such a siltation ordinance requirement must be imposed on this plant is that it will do little good to provide a high degree of treatment to solve the sewage pollution problem on the reservoir and yet lose the reservoir to siltation pollution.

Accordingly, the owner shall also establish silt monitoring and sampling stations on every creek drainage shed leading to the reservoir which has a development served by this high performance plant and ones in which the plant's sewer mains are located. These silt monitoring and sampling stations should be located where such creeks empty into the reservoir. At these points a known measuring point (e. g., base-line) for determining the reservoir bottom will be established and measured every six months by the owner. These reports of the silt measurements will be forwarded to the SWCB. If the base line depth is reduced by 10% then the jurisdictions which are using the plant and which are responsible for the siltation in that area must clean the reservoir in that area back to the base-line depth and submit a corrective action plan to prevent the silting problem from reoccuring.

9. An ordinance to require control over industrial waste shall be placed on the users of this plant. Specifically, the chemicals which cause deleterious effects on biological waste treatment

processes are to be prohibited. Further, each industry shall be required, as a minimum, to provide a sampling station where all of the waste from their individual plant can be sampled and flow measured at a point just before it enters into the treatment plant's sewage collection system. (Note: Alexandria's ordinance could be used as a starting point for preparing such an ordinance.)

10. An independent design review of the actual proposed detailed design of such a high performance plant shall be performed by a firm which has been closely involved in the detailed design and operation of the Lake Tahoe Plant. This is to ensure that the Virginia facility can make maximum use of the experience and knowledge gained from that facility. The results of the review and the resolution of comments shall be submitted to the SWCB when the final plans and specifications are submitted for the State's approval. Reviews such as this are required by law in the more advanced technologies to ensure a high quality of design. It is time that the same approach be taken on sewage plant designs.

11. Waste being processed in the existing small plants shall have the first priority on treatment capacity and such capacity shall be specifically reserved for them in the new high performance regional plants. New developments are to have second priority. Accordingly, the existing small plants (Table III. A) shall be taken out of service first and their flow sent to the high performance plant. The final plans and specifications for the high performance plant,

when they are submitted to the SWCB, shall include a detailed plan and schedule that clearly shows that these existing small plants shall be shut down before new development is allowed to connect into the new plant. Basically, this new plant must solve our existing problems first.

12. If any of the various administrative procedures of the owner or of jurisdictions served by the plant (e. g., siltation ordinance controls, etc.) prove ineffective under actual operating conditions, the SWCB shall have the right to place new requirements on the owner and jurisdictions and to require any necessary action by these parties to physically correct the damage done to the reservoir due to ineffective implementation of the administrative requirements covered herein.

13. Whenever the owner enters into an agreement with a jurisdiction for services of this plant, the owner shall be responsible for seeing that such jurisdictions have ordinances and rules to meet all the applicable requirements covered by this chapter. These ordinances and rules shall meet the owner's approval and the owner shall monitor and spot-check to see that the jurisdictions are effectively implementing their ordinances and rules to meet the requirements covered herein. The SWCB, at its discretion, can request the owner to submit to the SWCB for its approval the ordinances and rules that will be used to meet the Board's requirements covered herein.

## NOTE

It should be noted that these same administrative requirements would also have to be placed on a system that was based on an "Export Solution". Accordingly, these administrative requirements are Not Unique to the "Treatment Solution" proposed herein. In reality these administrative requirements are just good practice and should be applied to all sewage systems.

☆ U. S. GOVERNMENT PRINTING OFFICE : 1971 O - 423-259 (VOL. 2)